Operating instruction

Number of instruction:
LMI-02-01/10/11/ENG-US

Moisture analyzer
PMX series

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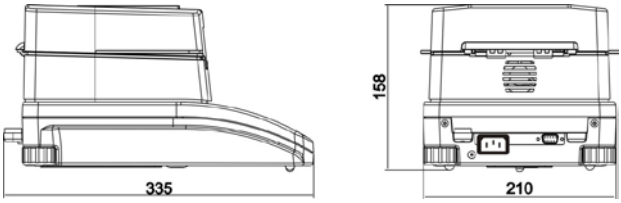
1. TECHNICAL PARAMETERS

Type	PMX 50/1	PMX 50
Max capacity	50 g	
Reading unit	0,1 mg	1 mg
Accuracy of moisture reading	0,0001%	0,001%
Tare range	-50 g	-50g
Max mass of sample	50 g	
Repeatability of moisture	+/-0,24% (sample do 2g), +/-0,06% (sample 2-10g), +/-0,04% (sample over 10g)	
Drying temperature range	max. 160°C (halogen, IR emiter) max. 250°C (halogen)	
Hitting module	Halogen IR emiter	
Drying modes	standard, quick, stepped, mild	
Auto switch off options	time defined, moisture stabilisation, time optimal, manual	
Operating temp.	+10 °C - +40 °C	
Power supply	120V 50Hz AC / 420W	
Display	graphic (backlit)	
Pan size	Ø 90mm, h = 8mm	
Net wright/gross weight	5,1/7,2kg	
Packaging size	455 x 315 x 302 mm	
Drying chamber dimensions	120 x 120 x 20 mm	

Dimensions:



2. BASIC INFORMATION

CAUTION!
Utilization of PMX moisture analyzer conversely to safety provisions and user manual may be hazardous to health and life. Never use the moisture analyzer is explosive area. Moisture analyzer is not prepared to use in areas with danger of explosion. The interior part of drying chamber may heat up to 400 °C. nominal power supply of moisture analyzer is from 120 to 230 V, thus it is necessary to use the device according to safety principles. The symbol visible on the top of the moisture analyzer cover (as presented below) is a warning against hot surface.

2.1. Purpose of use

Moisture analyzer is a device used for determination of relative humidity of small samples of various materials, determination of dry mass in small samples of various materials and determination of mass of weighed objects. It guarantees fast and precise determination of water content in tested sample, and through application of graphic display it provides easy use and operation. Moisture analyzer series PMX can be used to determine humidity content of multiple materials.

At the initial stage of measurement, the device precisely determines the mass of object placed on its weighing pan. Following this, there is fast heating of the sample with halogen or IR lamps. This causes vapouration of humidity from the tested sample. While sampling, the moisture analyzer is continuously checking the decline of mass, and after calculation, it displays current indications on the display of the balance.
Compared to conventional methods of humidity content determination in various materials, application of moisture analyzer series PMX significantly shortens measurement time and simplifies testing procedure. Moisture analyzer allows for setting of multiple parameters which influence testing of a sample, like temperature, time, drying profiles, etc.

2.2. Usage conditions

CAUTION!
If drying process is active do not allowed to open drying chamber. Moisture analyzer is equipped with a halogen lamp which is very powerful heat source.

Thus, user should pay special attention no to touch those elements of moisture analyzer that get hot while drying procedure (disposable pan, handle of pan, and internal cover of drying chamber). Please remember, that some elements may become dangerous if heated (poisoning vapours, danger of ignition or explosion).
Moisture analyzer can not be used for dynamic weighing. Even if small masses are added to taken off from weighing pan, than weighing result should only be read if stability marker ◣◢ is displayed. Do not put magnetic materials on weighing pan of a moisture analyzer. This can defect the measuring set of the device. Do avoid dynamic loading of weighing pan, and do not exceed maximal capacity of the device. Please consider applied tare mass when calculating mass of tested object. Never use moisture analyzer in explosive area. Moisture analyzer is not designed and adjusted to operate in explosive conditions. Do not perform any modifications to the device.

2.3. Principles of safety operation

Use of PMX moisture analyzer conversely to safety principles and user manual may be hazardous to operator's health and life. It is obligatory to acknowledge with safety principles listed in user manual:

- use moisture analyzer onto to determine humidity content in samples and determination of sample mass. Any other use of moisture analyzer may be dangerous either to the device or the user,
- before switching on the moisture analyzer, make sure that the nominal power of the device specified on its data plate, is compatible with the supply in the mains to which moisture analyzer is connectable,
- **change of halogen can be carried out only in authorized service**,
- protect moisture analyzer against contacts with liquids,
- as the area around moisture analyzer gets heated, do not put any inflammable objects or substances in close distance to device,
- substance containing toxic or caustic vapour should be tested in a chamber which absorbs the vapours,
- samples of substances that produce inflammable vapours if heated should have relatively small mass, and drying process should be performed in low temperatures,
- please remember that aggressive substances may cause corrosion to the device.

2.4. Warranty

Warranty does not cover below mentioned cases:

- Not observing the regulation listed in user manual,
- Use of the moisture analyzer conversely to its application,
- Any modifications of moisture analyzer,

- Mechanical defects and defects caused by media, liquids and natural wearing off,
- Improper placing of defects of electrical network / mains,
- Overloading of measuring mechanism of the moisture analyzer.

2.5. Supervision over metrological parameters of the moisture analyzer

Metrological features of the moisture analyzer should be checked by the user in set period of time. This period depends on environmental factors of moisture analyzer's location, kinds of performed processes and quality system introduced byte user.

2.6. Data in the user manual

Read the user manual carefully before switching on the device, even if the user is experienced with this kind of devices.

2.7. Operation competence

Moisture analyzer should only be operated and supervised by trained personnel with experience in usage of this kind of devices.

3. TRANSORT AND STORAGE

3.1. Delivery check

Please check delivered package and device immediately after receipt and evaluate whether its free from any external defects.

3.2. Packaging

Please keep on stock all the elements of the packaging, in case future transport of a moisture analyzer is needed. Only the original packaging of the moisture analyzer is suitable for transportation purposes. Before packing, please unplug the device from mains, and take out all moveable parts (pan, covers, etc.). parts of moisture analyzer should be put into original packaging, so that they are protected while transport.

4. UNPACKING, INSTALLATION AND DEVICE CHECKING

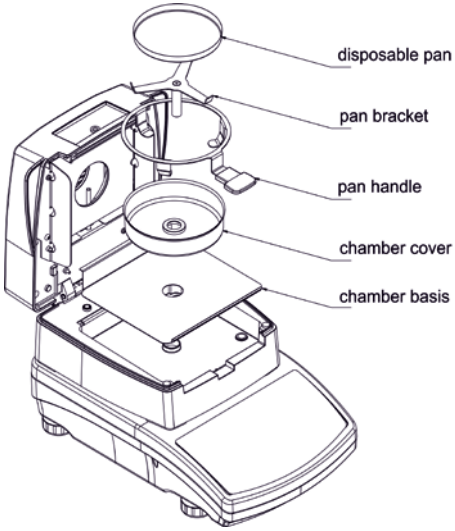
4.1. Installation place and operation place

* Moisture analyzer should be stored and used in places free from vibration and shakes, free of wind and breeze, dust free and not higher than 2000 meters above sea level,
* Operation place should be situated in place with good air circulation, especially around the device (20 cm around the moisture analyzer, and 1 meter from top of the device).
* Room temperature should equal:
  +10 °C ÷ +40 °C,
* Relative humidity of operation room should not exceed 80% in 31°C, and decrease linearly to 50% of in 40°C,
* Moisture analyzer should be placed on a wall console or a stable table, free of vibration and shakes , and distant from heat sources,
* Special attention should be paid to weighing magnetic materials, as balance is equipped with a strong magnet.

4.2. Unpacking

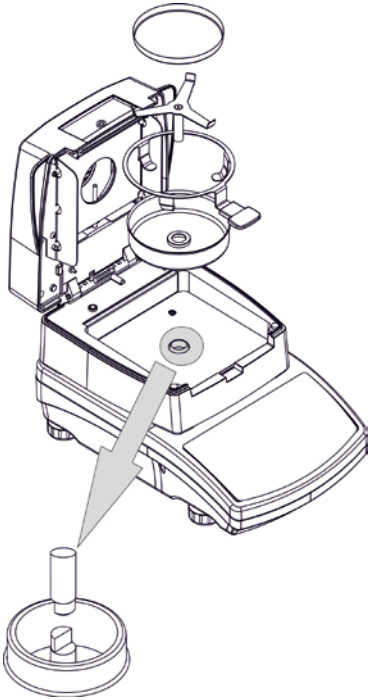
Gently take the moisture analyzer from package, take off plastic, cartoon and foil transport protections, and gently put the device in previously prepared operation place. Install components of moisture analyzer according to below schema:

Montage schema for parts of moisture analyzer:



- Install cover of drying chamber,
- Install weighing pan handle,
- Install pan supporter,
- Put disposable weighing pan in prepared place.

Setting the pan supporter.



When installing weighing pan suppeorter, pay special attention to positioning of the weighing pan mandrel cross. The mandrel is equipped with special cut for unique positioning of the handle towards the cross, which eliminates their contact and friction. Positioning of weighing pan cross:

- After placing the weighing pan cross on the mandrel, turn the cross slightly, so

that the cutting on the mandrels are situation in correct position,
- When turning the mandrel, use most gentle movements so that mechanism of the moisture analyzer is not damaged

4.3. Setting

Before switching on the device, please level the moisture analyzer using the feet situated at the back of its casing. The bubble of the level should be situation in the centre of the ring.

4.4. List of standard elements of the delivery

- Moisture analyzer.
- Insert for base of the drying chamber.
- Drying chamber cover.

- Pan holder.
- Cross.
- Disposable pan.
- Power cable.
- User manual.

4.5. Cleaning of moisture analyzer

Moisture analyzer should be cleaned with use of a damp cloth. Gently rub dirty places. Weighing pan must be removed from the moisture analyzer for cleaning. **Cleaning weighing pan when it is installed may cause damage of moisture analyzer mechanism. Remember about disconnecting the moisture analyzer from power supply before the cleaning.**

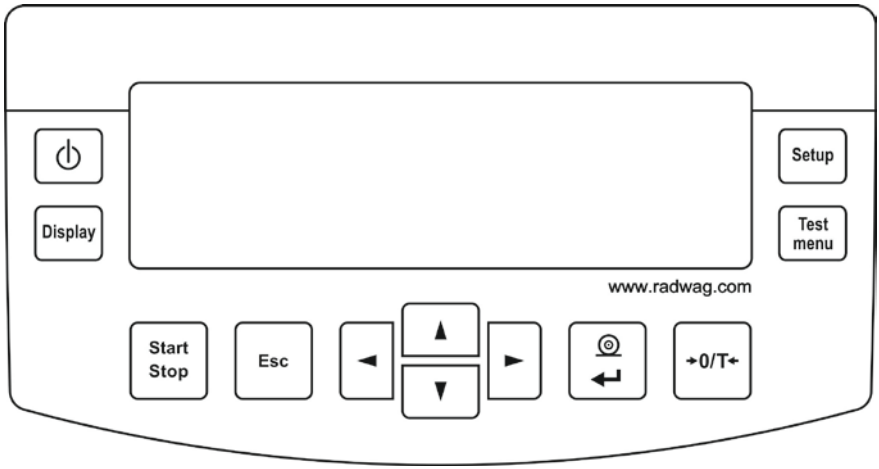
4.6. Connecting to mains

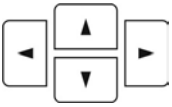
Moisture analyzer can be connected to mains only by means of original supply wire which is basic equipment of balance. Rated voltage (given on data plate) should be consistent with mains rated voltage.
Supply wire can be connected only to socket with ground contact. Switch on supply of moisture analyzer – plug of supply wire should be connected to the socket on the back of analyzer casing.
Display of moisture analyzer will indicate name and number of program, next display will indicate 0.000 g (for balances with accuracy of 1 mg) or 0.0000 g (for balances with accuracy of 0,1 mg). If indication is different from zero, press **TARE** key.

4.7. Connection of additional equipment

Before connection of additional equipment or its change (printer, computer PC), disconnect the moisture analyzer from power supply. Only additional equipment which is recommended by the manufacturer of moisture analyzer can be connected to it. After connecting the devices, plug in the moisture analyzer to power supply.

5. KEYBOARD OF MOISTURE ANALYZER



	Start/Stop key – switch on/ off process of drying according to chosen program.
	Esc key, resignation from introduced changes / exit to one level higher in menu.
	Group of navigation keys – change of parameters value; moving in menu.
	Print/Enter key – sending display state to external device (Print) or confirmation of chosen value or function (Enter).
	TARA key – zeroing the indications.
	On/Off key – switch on/off display of moisture analyzer. After switch off the display, other subassemblies are supplied, moisture analyzer will be in standby mode

Display	**Display** key – changes type of data displayed during and after drying process.
Setup	**Setup** key – enter to main menu.
Test menu	**Test menu** key – starting choice of drying modes.

6. MENU OF MOISTURE ANALYZER

User menu of moisture analyzers is divided into two modes. First one is available after pressing **SETUP** key. This menu permits calibration, time and data format, temperature, communication setting and print criteria. Second one is available after pressing **TEST MENU** key. This menu permits setting up parameters which includes test temperature, profilling, timed information and other parameters. A test library is also included which holds data for up to 100 tests which can be recalled and run at any time.

P1 Calibration
- P1 01 Ext. calibr.
- P1 02 User calibr.
- P1 03 Calibr. test
- P1 04 Temp. calibr.
- P1 05 Print report

P2 GLP
- P2 01 User
- P2 02 Project
- P2 03 Time print
- P2 04 Date print
- P2 05 User print
- P2 06 Project print
- P2 07 Id print
- P2 08 Last cal print

P3 Date/Time
- P3 01 Date format
- P3 02 Time format
- P3 03 Time
- P3 04 Date
- P3 05 Disp. time
- P3 06 Disp. date

P5 RS-232
- P5 01 Baud rate
- P5 02 Parity
- P5 03 Data bits
- P5 04 Stop bits
- P5 05 Handshake
- P5 06 Print on stable
- P5 07 Printer type

P6 Printouts
- P6 01 Printout No.
- P6 02 Header No.
- P6 03 Line No.
- P6 04 Footer No.
- P6 05 Pr. 1 start
- P6 06 Pr. 1 stop
- P6 13 String 1
- P6 92 String 80

P7 Globals
- P7 01 Password
- P7 02 Prog. library
- P7 03 Beep
- P7 04 Language

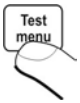
P4 Readout
- P4 01 Filter
- P4 02 Autozero
- P4 03 Temperature
- P4 04 Negative

P7 05 Backlight
P7 06 Brightness
P7 07 Contrast
P7 08 Balance Id
P7 09 Software rev.
P7 10 Par. printout
P7 11 Par. receive.
P7 12 ID settings
P7 13 ID autoprint

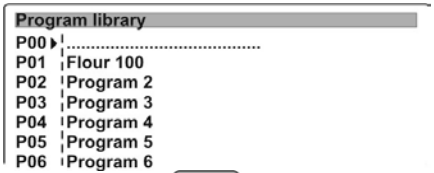
7. MOVING IN USER MENU

It can be done by means of: keyboard, PS keyboard, commands sent from computer to the analyzer.

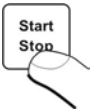
7.1. Menu operation



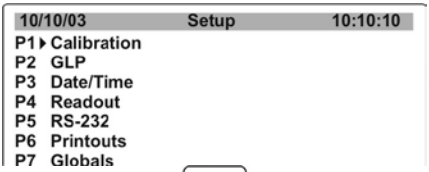
How to enter to choice of drying modes?
Pressing the **Test Menu** button accesses the Test library menu. Library contains up to 100 tests. All tests which are previously entered can be recalled and the parameters for the recalled tests when selected will be repeated.



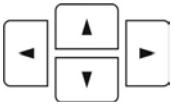
How to escape menu without recording changes?
Press **Esc** key.



How to enter main menu of moisture analyzer?
After pressing **Setup**, Access to user menu of analyzer is available.

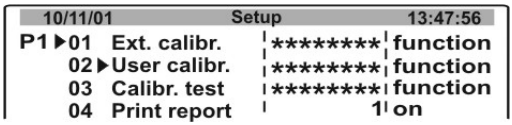


How to exit the setup menu without making changes?
Press **Esc** key twice.

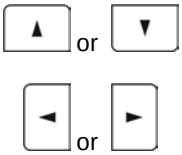


How to select the menu option?
Press either the up or down arrows

keys and scroll to the desired options.



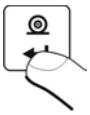
How to enter the chosen function in menu?
After scrolling to desired function press button **SETUP**.



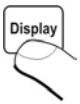
How to change parameters and functions?

Press the **UP/DOWN** buttons to scroll through values of parameters from software or active mark changes (flashing) f.eg. in Name.

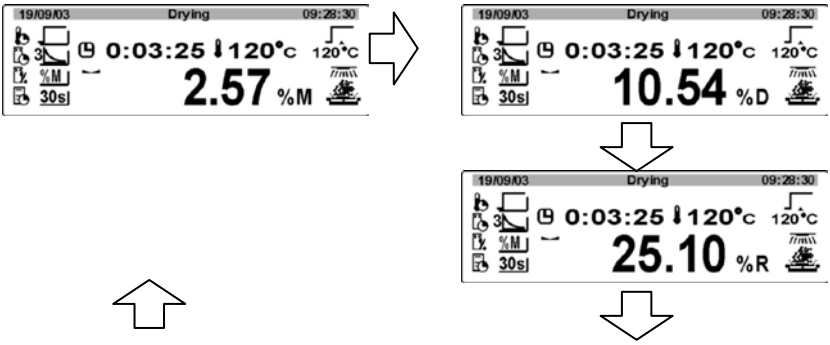
Press either the **LEFT/RIGHT** arrows buttons and scroll to desired sign e.g. in name which we want to change.

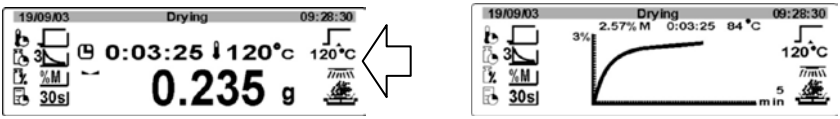


How to confirm changes in functions and parameters?
Press **PRINT/ENTER** button to confirm.

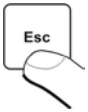


How to change displayed data during drying?
There are five methods of presentation results during and after drying in the moisture analyzer menu. To change the method press **DISPLAY** button. Drying time, temperature in the chamber, drying profile, result in %M; %D; %R – diagram, lost of mass (in [g]) are expose on the display.

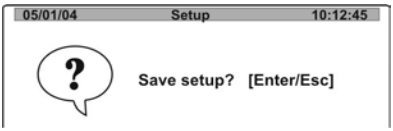


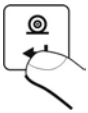


Changes are confirmed after return to weighing mode with procedure of confirming changes.

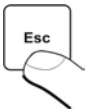


After entering all changes, press few times **ESC**, until display indicates **Save? [Enter/Esc]**.





After displaying the command, choose one of possibilities:
ENTER – save changes



ESC – without record

7.2. By means of computer keyboard PS type

Each key on the analyzer keyboard has its equivalent on the PS keyboard according to below scheme:

- for functional keys

	Description	Balance
F1	Switch on/off drying process in selected program	Start Stop
F2	Enter main menu.	Setup

F3	Enter choice menu and select drying program.	Test menu
F4	Change of type of displayed data about drying.	Display
F5	Transmission data to external device (PRINT).	
F6	Zeroing/Tarring of analyzer indication.	→0/T←

-for directional keys

↑	Scrolling arrow up	▲
←	Exit to menu one level higher	◄
→	Enter setting chosen parameter	►
↓	Scrolling arrow down	▼

- for ENTER / PRINT and ESC keys

Enter	Confirm the value	
Esc	Escape and leave function without changes	Esc

8. USER MENU OF MOISTURE ANALYZER

User menu is activated by pressing **SETUP** key.
In menu it is possible to: calibrate the analyzer, set transmission parameters, set the date and time and their format and other usage parameters of program. In this part of manual, program possibilities of moisture analyzer and methods of setting and change of particular parameters will be described.

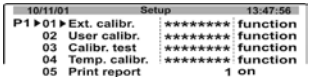
8.1. Calibration of moisture analyzer

8.1.1. Calibration of moisture analyzer

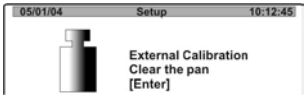
If the moisture analyzer is used as laboratory analyzer make the calibration before test.

Calibration determines relations between value shown by the analyzer and standard mass (calibration mass) which is load and corrects indication if it is necessary.
Additional equipment of the moisture analyzer is F2 weight to make the calibration.

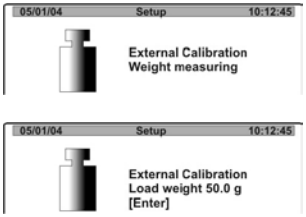
Type	Calibration mass
PMX	50g


10/11/01 Setup 13:47:56
P1 ▸01 ▸Ext. calibr. ******** function
02 User calibr. ******** function
03 Calibr. test ******** function
04 Temp. calibr. ******** function
05 Print report 1 on

Enter menu group **P1 Calibration**.
Scroll to parameter **01 Ext. calibr.**

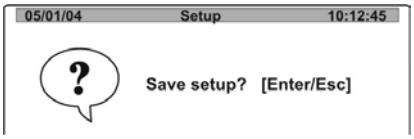


Press **Right** key.
Command to take the weight off the pan is displayed (pan must be empty). After empty pan press **ENTER** key**.**



The analyzer shows command it determines mass of empty pan and then following command for user to put weight 50.0 g.

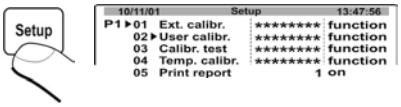
a) After the calibration the instrument returns to submenu **P1 – Calibration**
b) Press **ESC** key many times until appears



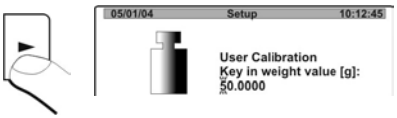
c) After the calibration the instrument returns to submenu **P1 –**
d) Calibration
e) Press **ESC** key many times until appears

8.1.2. User calibration

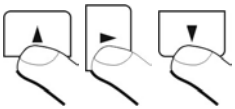
User's calibration must be done by means of $\mathbf{F_2}$ calibration mass.



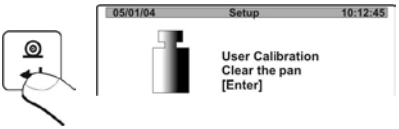
Enter menu **P1 Calibration**.
Scroll to parameter **02 User calibr.**



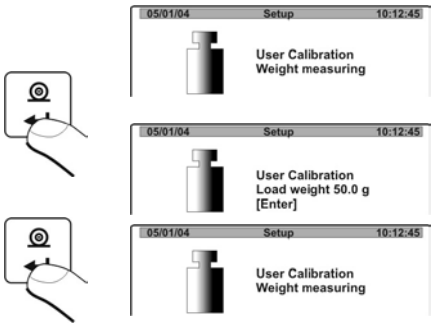
Press **Right** key
The analyzer shows command to introduce calibration mass.
If first digit is flashing it can be changed.



Introduce new external weight using functional keys.



Confirm calibration mass. Analyzer will start the calibration giving successive commands on display.



Analyzer will inform about determining mass of empty pan and next to place the calibration mass of declared mass.

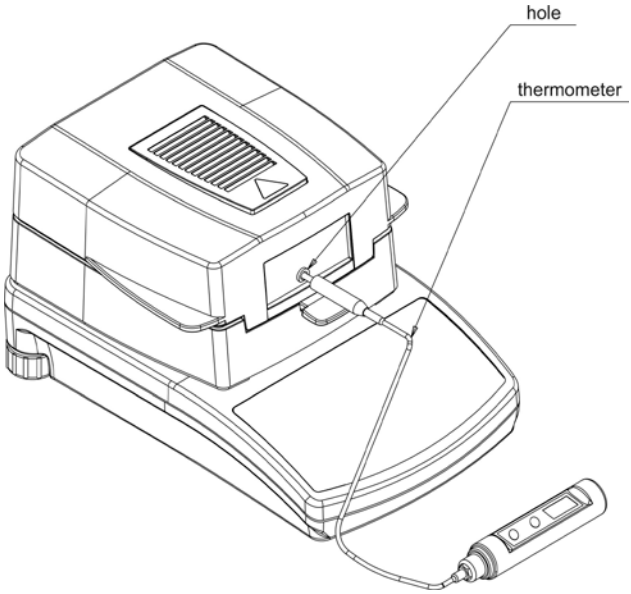
Put declared mass on the pan and press key **Enter** to confirm**.**
The instruments returns to menu to group **P1 Calibration**.

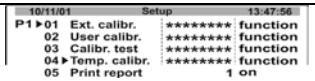
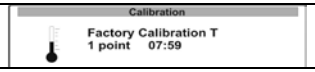
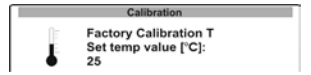
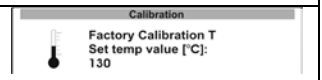
According to previous point move to weighing mode.

1. External mass must be ¾ of max capacity

8.1.3. Temperature calibration

Calibration of drying chamber is a process which task is to calibrate temperature sensor of moisture analyzer. To carry out the temperature calibration of moisture analyzer, place the control thermometer in drying chamber hole as show on the picture below.



		Enter menu **P1 Calibration**. Scroll to parameter **04 Temp. calibr.**
		Press the navigation key.
		
		

8.1.4. Calibration test

During calibration test value of calibration mass is compared to present result of weighing.
It is just checking and the result have no influence on changes of factors. After displaying results press key **ESC**.

Calibration test

a) Move to submenu **P1 – Calibration**.
b) Scroll to function **Calibration test**
c) Press key **Right**
d) The instrument makes test
   Check results
   Cal. – load on the pan
   Act. – calibration mass in moisture analyzer memory
   Dif. – difference between these two values
e) Return to weighing mode in point 6 of instruction manual.

8.1.5. Temperature calibration

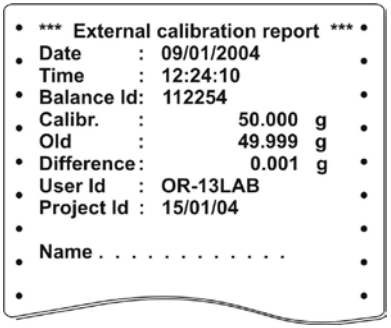
Parameter enebling to carry out temperature sensor calibration in drying chamber.

8.1.6. Printout of the calibration report

After each calibration report can be printed. The report is printed on external printer or sent to computer and recorded in the file to archivize.

P1 08 Print report : **1 : on** – report is printed
P1 08 Print report : **0 : off** – without printing report
If parameter is set up 1the report is generated and sent automatically.

Example of the calibration report:


*** External calibration report ***
Date : 09/01/2004
Time : 12:24:10
Balance Id: 112254
Calibr. : 50.000 g
Old : 49.999 g
Difference : 0.001 g
User Id : OR-13LAB
Project Id : 15/01/04
Name . . . . . .

Contents of the printout depends on the set parameters in the group **P2 GLP** *(see **point 8.2** of the manual).* The variables with values set on ***1: tak*** are printed.
Report contains also calibration mass defined during actual calibration (description **Calibr.:**)
calibration mass remembered by the analyzer (description **Old:**)
deviation of the calibration (description **Difference:**), so difference between these masses.

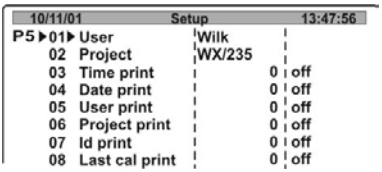
8.2. Printouts for GLP procedures

Group of parameters which enables to introduce user's name and project and data declaration which are printed in reports and standard printouts. All information can be introduced using analyzer desk or PS keyboard

Use PS keyboard. It is easier and faster method.

8.2.1. User

Enter menu group **P2 GLP**


10/11/01 Setup 13:47:56
P5 ▶01▶ User Wilk
02 Project WX/235
03 Time print 0 off
04 Date print 0 off
05 User print 0 off
06 Project print 0 off
07 Id print 0 off
08 Last cal print 0 off

Introducing user's name

<u>Using the analyzer keyboard</u>
Pressing the navigation key give you access to the parameter **01 User** where you can introduce name or number of the operator as series of digital or letters, not more than 8 signs. Use the direction keys. All marks and digits are accessible in closed cycle. Select the right one. Move into right side and write next mark in. After write all marks in press the key **ENTER.**

<u>Using PS keyboard</u>

Pressing the **F2** key enter main menu, press the **F3** key and scroll to the parameter (dark triangle) **01 User**. Pressing the key **F2** give you access to setting the parameter (firts mark of the number is flashing and pulsing indicator if the number was not written in), by means of the keyboard write new name of the user **User** and confirm by pressing the key **Enter**. Using the keys **Esc** and **Enter** move into weighing mode.

8.2.2. Project

Name of the project contains max 8 marks. Project name should be written in the same way as user's name. (according to point 8.2.1).

8.2.3. Parameters concerning content of GLP procedures

In the standard printout set up following data which are printed:

P2 03 Time print
measurement time and reports of real time clock

P2 04 Date print
measurement date and reports of the real time clock

P2 05 User print
user's name in the parameter **P2 01 User**

P2 06 Project print
project name in the parameter **P2 02 Project**

P2 07 ID print
analyzer number given by the producer

P2 08 Last caribration print
printout with the information about last calibration: date and time, kind, deviation

The parameters of the data which are printed must be set on „1 on"

EXAMPLES OF PRINTOUTS FOR DIFFERENT SETTINGS GLP

P2 03 time print :on
P2 04 date print :on
P2 05 user print :on
P2 06 project print :on
P2 07 Id print :on
P2 08 last cal print :on

```
Date     : 16/01/2002
Time     : 13:12:30
User     : R. Wilk
Project  : Sprawd.
Balance  : 11111111
Last calibration:
----------------------
```

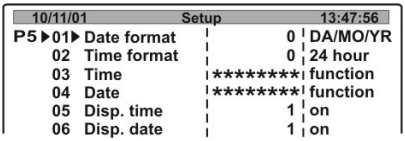
16/01/2002 13:02 External calibration Difference.: 0.0001 g ---------- 130.0500 g

P2 03 time print :off ***P2 04 date print :on*** ***P2 05 user print :on*** ***P2 06 project print :off*** ***P2 07 Id print :on*** ***P2 08 last cal print :off***	Date : 16/01/2002 User: R. Wilk Balance : 11111111 ? 12.0085 g

8.3. Setting time and date

Parameters to set up date and real time clock in memory and to display and print them.

How to enter menu group P3 Date/Time
Enter menu **P3 Date/Time**


10/11/01 Setup 13:47:56
P5 ▶01▶ Date format 0 DA/MO/YR
02 Time format 0 24 hour
03 Time ******** function
04 Date ******** function
05 Disp. time 1 on
06 Disp. date 1 on

8.3.1. Setting date format

Press navigation key and come to submenu **01 Date format.**
Set up one of the values:

1 date format - **M**onth / **D**ay / **Y**ear
2 date format - **D**ay / **M**onth / **Y**ear

Confirm by **ENTER** key.

8.3.2. Setting time format

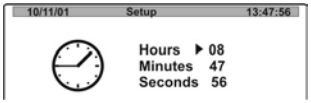
Press **Right** key to enter menu **02 Time format.**
Set up one of the values:

1 time format - **12 hour**.
2 time format – **24 hour.**

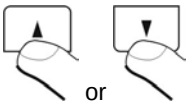
Confirm by pressing key **ENTER**
Format **12 hours**. It is distinguished by letters **PM** or **AM** on the printouts.

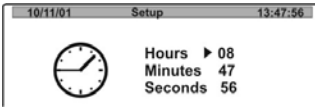
8.3.3. Setting time

With **Right** key enter to paramater **03 Time** setting



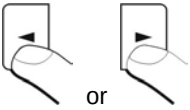
Set current time:

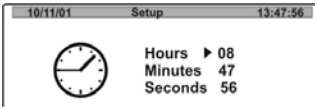




Scroll to value which is changed (Hour, Minutes, Seconds) .

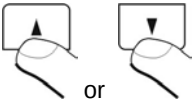
Enter setting value (first digit is flashing)



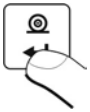


Set up new value using keys

Selection of digit change



Value of digit change



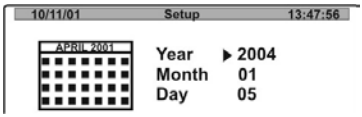
Confirm set value (previously changed digit stops flashing)

Repeat previous actions for following values. After set up new time press key **ENTER**. The analyzer returns to submenu **P3 Date/Time** and the hour changes.

After set up new time return to weighing mode according to point 7 of instruction manual.

8.3.4. Setting date

Press **Right** key to set parameter **04 Date**



According to previous point 8**.3.3** set up present date. Then return to weighing mode according to point 7.1 of the manual.

8.3.5. Determination if date and time should be displayed

User decides if date and time is displayed. If suitable values of parameters are set date and time are displayed.

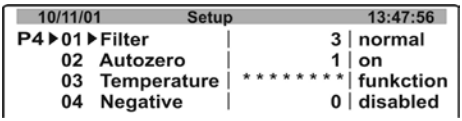
The values can be changed according to point 6. If parameter = **1** date and time are displayed on upper bargraph of screen.

8.4. Setting parameters of work for the moisture analyzer

The moisture analyzer can be adjusted to difficult conditions of work by means of suitable parameters in group **<P4 Readout>** (autozero, displaying last digit).

8.4.1. Menu group P4 Readout

Enter menu group **P4 Readout**



8.4.2. Filter setting

Depending on conditions of work set up filter. For perfect conditions set up filter as very fast (value of parameter **01 Filter** for **1**), but if the conditions are difficult (vibrations, draughts) set up filter as slowly or very slowly (parameter **01 Filter** for **4** or **5**). Efficiency of filter working is different for different range of filter working. Filter works slower during achieving weighing mass and faster if mass is in set range of filter (parameter range of filter working is accessible from level of service menu – user has no access to it).

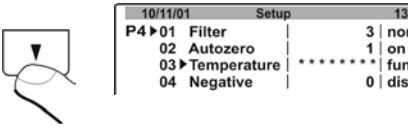
8.4.3. Setting the autozero operation

Programmable function „**AUTOZERO"** controls and corrects zero indication automatically.

Parameters which define the range and time of autozero are set up by the manufacturer and there is no access to it for the user.

AUTOZERO function is turn on if the measurement starts at precise zero. Turn off the autozero function depends on the unstable result if there is no load on the pan.
This function is very helpfull during slowly pouring the substance.
Switch on/off **AUTOZERO** function in the parameter **P4 02**.

8.4.4. View of the temperature inside the drying chamber



Scroll to parameter **P4 03 Temperature**.

Press the **Setup** key. Temperature inside the drying chamber is displayed. To return to previous display press **Esc** key.

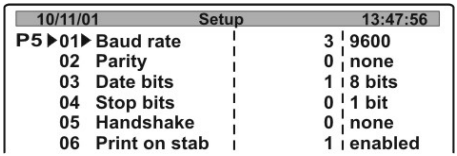
8.4.5. Negative

Parameter determining method of data indication on the display. Depending on used display, set the parameter in a appropriate way.

8.5. Functions connected with use of RS 232

User can set up the parameters for correct communication with the computer or printer.

Enter menu group **P5 RS-232**

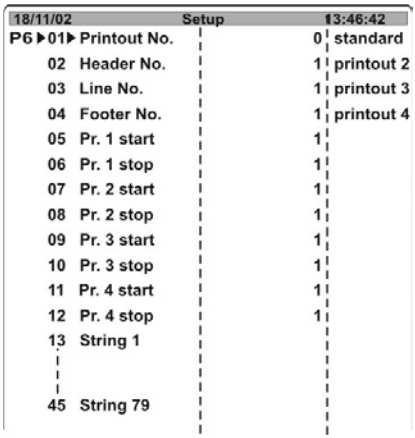

10/11/01 Setup 13:47:56
P5 ▶01 ▶Baud rate 3 9600
02 Parity 0 none
03 Date bits 1 8 bits
04 Stop bits 0 1 bit
05 Handshake 0 none
06 Print on stab 1 enabled

8.5.1. Set up values of parameters

By means of functional keys set up values of parameters (see point 7 of the manual – moving in user menu) which have influence on correct communication analyzer – computer or analyzer - printer:

Number and parameter name	Value of parameter	Number and parameter name	Value of parameter
01 Baud rate:	0 : 2400; 1 : 4800; 2 : 9600; 3 : 19200	05 Handshake	0 : none; 1 : RTS/CTS; 2 : XON/XOFF
02 Parity	0 : none; 1 : even; 2 : odd	06 Print on stable	0 : disabled; 1 : enabled
03 Date bits	1 : 7 bits; 2 : 8 bits	07 Printer type	0 : Stand. 1 : Kafka 2 : Epson
04 Stop bits	1 : 1 bit; 2 : 2 bits		

8.6. Printouts


18/11/02
Setup
13:46:42
P6 ▶01▶ Printout No. 0 standard
02 Header No. 1 printout 2
03 Line No. 1 printout 3
04 Footer No. 1 printout 4
05 Pr. 1 start 1
06 Pr. 1 stop 1
07 Pr. 2 start 1
08 Pr. 2 stop 1
09 Pr. 3 start 1
10 Pr. 3 stop 1
11 Pr. 4 start 1
12 Pr. 4 stop 1
13 String 1
45 String 79

Operator can set up 5 different versions of printouts which are sent to external device (printer, computer) through socket RS 232.

- one **STANDARD** – with data set in the procedures GLP
- four **NOT STANDARD**– freely programmed

8.6.1. Standard printout

The instrument sends after pressing the **ENTER / PRINT** key through **RS 232** display (load mass) and declared variable in submenu **P2 GLP**.

Exemplary printouts in weighing mode:

62.690 g	Date : 22/10/2001 Time : 13.04.23 User : WILK Project : XW/456 62.690 g	Date :22/10/2001 Time : 13.16.49 User : WILK Project : XW/456 Balance : 10 ? 62.685 g

Question mark before load mass indicates that result of weighing is not stable.

There are three parts in the printout:

- Headline (with information about chosen drying procedure and start mass of the sample)
- Line (partial time of drying and result of the moisture)
- Footer (with the final mass, total drying time and final result)

8.6.2. Nonstandard printouts

Rules about creating not standard printouts:

1. user can create own 4 printouts
2. for each printout give text number which starts number e.g. **Printout 1 Start – 1** and text number which finishes the printout e.g. **Printout 1 Stop – 40.** In that case text contents is printed from1 to text 40.
3. then write in text contents to lines 1 **÷** 40. It is recommended to use the PC keyboard
4. Not standard printouts can cloud over each other etc.: **Printout 1 Start – 1**
   Printout 1 Stop – 40
   Printout 2 Start – 20
   Printout 2 Stop – 40

Not standard printout can contains:

- Variables depending on the user's needs (mass, date, Number of the project, temperature of the chamber etc.)
- Stable texts in user's menu

Composed not standard printout contains not more than **640** marks written as **80** texts **8** marks each(from the parameter **String 1** to **String 80**). User can compose **4** not standard printouts.

8.6.3. Writing texts in

Variables in the printouts

%%	Printout of singular mark „%"	**%K**	Kind of the last calibration
%N	Actual net mass in basic unit	**%I**	Deviation in the last calibration
%d	Actual date	**%1**	Code 1
%t	Actual time	**%2**	Code 2
%i	Number of the analyzer	**%3**	Code 3
%r	Number of the program	**%4**	Code 4
%P	Project number	**%5**	Code 5
%U	User's number	**%6**	Code 6
%k	Date and time of the last calibration		

Variables only in drying function

%C	Temperature of drying chamber
%M	Drying result – moisture
%D	Drying result – dry
%R	Drying result – moisture/dry
%N	Drying result – actual net mass in the basic unit
%c	Drying time
%S	Start mass of the sample
%E	Final mass of the sample
%p	Parameter of chosen drying procedure

Special marks used in creating special printouts

****	Singular mark „\"
\c	CRLF
\r	CR
\n	LF
\t	Tabulator
\s	Move to next „string"
\0	Finish the printout

Each text (**String 1 ÷ 89 String 80**) contains max **8 marks** (letters, digits, special marks, spaces). To write the sentence which contains many words and marks create them with neighbouring texts with 8 marks each. User can use special marks (mentioned below) to include variables depending on the needs.

Example 1:

The maximum mass of the load cannot exceed 11,250 g!

To write this sentence use 46 grouped marks in neighbouring lines of the text. Write 8 marks in each text untill the sentence finishes.

Parameter no.	*Text*							
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
19 Text 10	**T**	**h**	**e**		**m**	**a**	**x**	**i**
20 Text 11	**m**	**u**	**m**		**m**	**a**	**s**	**s**
21 Text 12	**o**	**f**		**t**	**h**	**e**		**l**
22 Text 13	**l**	**o**	**a**	**d**		**c**	**a**	**n**
23 Text 14	**n**	**o**	**t**		**e**	**x**	**c**	**e**
24 Text 15	**e**	**d**		**1**	**1**	**,**	**2**	**5**
25 Text 16	**0**		**g**	**!**				

Example 2:

Zakład Mechaniki Precyzyjnej „RADWAG”
Date:
Time:
Load mass:

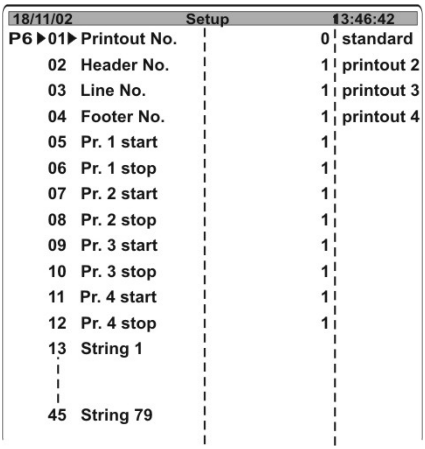
*****Signature:.....***
*****<actual work mode>*****

Enter setting the following texts and write 8 marks in each of them untill you finish writting printout in

Parameter no.	*Text*							
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
25 Text 17	***Z***	***a***	***k***	***ł***	***a***	***d***		***M***
26 Text 18	***e***	***c***	***h***	***a***	***n***	***i***	***k***	***i***
27 Text 19		***P***	***r***	***e***	***c***	***y***	***z***	***y***
28 Text 20	***j***	***n***	***e***	***j***		***„***	***R***	***A***
29 Text 21	***D***	***W***	***A***	***G***	***„***	******	***c***	***D***
30 Text 22	***a***	***t***	***e***	***:***	***%***	***d***	******	***c***
31 Text 23	***T***	***i***	***m***	***e***	***:***	***%***	***t***	******
32 Text 24	***r***	******	***n***	***L***	***o***	***a***	***d***	
33 Text 25	***m***	***a***	***s***	***s***	***:***	***%***	***N***	******
34 Text 26	***c***	******	***c***	*****	*****	*****	*****	*****
35 Text 27	***S***	***i***	***g***	***n***	***a***	***t***	***u***	***r***
36 Text 28	***e***	***:***	***.***	***.***	***.***	***.***	***.***	***.***
37 Text 29	***.***	***.***	***.***	***.***	******	***c***	*****	*****
38 Text 30	*****	***%***	***F***	*****	*****	*****		
39 Text 31								

Selection of the text

Enter paramaters group **P6 Printouts**


18/11/02
Setup
13:46:42
P6 ▶01▶ Printout No. 0 standard
02 Header No. 1 printout 2
03 Line No. 1 printout 3
04 Footer No. 1 printout 4
05 Pr. 1 start 1
06 Pr. 1 stop 1
07 Pr. 2 start 1
08 Pr. 2 stop 1
09 Pr. 3 start 1
10 Pr. 3 stop 1
11 Pr. 4 start 1
12 Pr. 4 stop 1
13 String 1
45 String 79

Scroll to the text (from text 1 to text 80). Pressing the navigation key enter the setting the parameter (if the parameter field was empty pulsing sign appears at the beginning. If the text was in the field first mark of this line flashes).

Method of entering the texts:

a) from balance keyboard

▲	Move up through collection of the digits, letters and marks o **1**
▼	Move up through collection of the digits, letters and marks o **1**
►	Move to **RIGHT** side (next pressing moves in **RIGHT** flashing sign , if we do not write in the sign we introduce **spaces** in the text by pressing this sign)
◄	Select sign to change by moving in **LEFT**side (next pressing the button causes cancelling flashing sign and makes the previous sign flashes)
◎ ↵	Confirm entered text

b) by means of PS keyboard

Pressing the **F2** key give you access to main menu, press **F3** or scroll to group **P6 Printouts** and press the **F2** key to enter menu group. Then by means of cursors scroll to demanded parameter and pressing the **F2** key to activate procedure of introducing text. By means of keyboard write the text

(max 8 marks) and confirm by the **Enter** key. Repeat the operation for rest of the texts.

8.6.4. Selection of printouts

According to point **5.2.6** enter menu group **P6 Printouts**. For parameter **P6 01 Printout Nr** select one of the values:

0 : standard
1 : printout 1
2 : printout 2
3 : printout 3
4 : printout 4

After selection suitable value confirm by the **ENTER** key.

8.6.5. Setting non-standard printouts

To set up e.g. **Printout 1**

Enter group of the parameters **P6 Printouts** (according to point 5.2.6). In the parameter **01 Printout Nr** introduce **1: Printout 1** (according to point 13.2.2) and in the parameter **02 Printout. 1 start** declare beginning of the text (number of the text which starts the **Printout 1**). You can introduce the values from 1 to 80 !

After introduce number of beginning of the printout introduce number of the text which finishes the printout. To do that:
Enter setting the parameter **03 Printout. 1 stop** and declare end of the text (number of the text which finishes **Printout 1**). You can introduce values from 1 to 80!

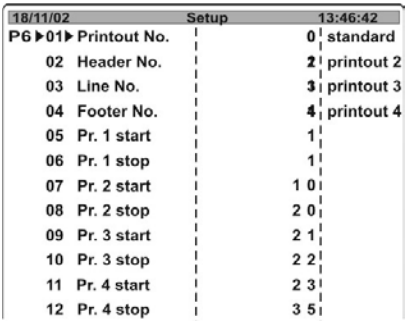
After confirmation and return to weighing mode and recording the changes each press the **PRINT** key prints out declared text.

8.6.6. Non-standard printouts in drying mode

Scheme of creating not standard printout for function of drying is the same as for weighing function. The only one characteristic which differs it from the printout is separate definition of three parts of the printout (see standard printout for the drying): **Headline**, **Line**, **Footer**.

Example of definition of drying printout:

Headline – Printout 2
Line – Printout 3
Footer – Printout 4



18/11/02		Setup	13:46:42
P6 ▶ 01 ▶	Printout No.	0	standard
02	Header No.	2	printout 2
03	Line No.	3	printout 3
04	Footer No.	4	printout 4
05	Pr. 1 start	1	
06	Pr. 1 stop	1	
07	Pr. 2 start	1 0	
08	Pr. 2 stop	2 0	
09	Pr. 3 start	2 1	
10	Pr. 3 stop	2 2	
11	Pr. 4 start	2 3	
12	Pr. 4 stop	3 5	

Printout 2

22	String 10	Drying_s
23	String 11	tart \cDa
24	String 12	te:%d \cT
25	String 13	ime:%t \c
26	String 14	Drying_p
27	String 15	arameter
28	String 16	s. \c \c%p
29	String 17	\c \c \Sta
30	String 18	rt _weigh
31	String 19	t :%N \c \c
32	String 20	\0 _____

Printout 3

33	String 21	%C%M \c%N
34	String 22	\c \0 ____

Printout 4

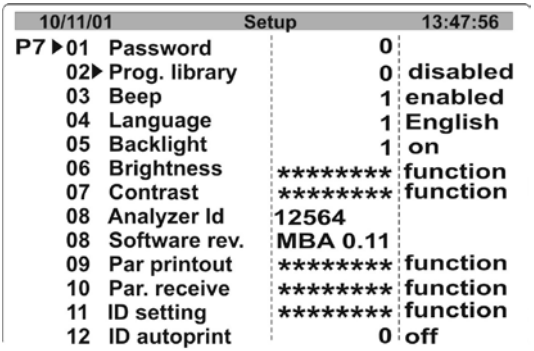
35	String 23	Stop_wei
36	String 24	ght:%N \c
37	String 25	Time_dry
38	String 26	ing:%C \c
39	String 27	\cFinal_
40	String 28	result:%
41	String 29	M \c \cDry
42	String 30	ing_stop
43	String 31	\c \cSign
44	String 32	ature:.
45	String 33	.....
46	String 34	.....
47	String 35	\c \0 ____

8.7. Setup the parameters

User can set up various parameters depending on needs. The parameters decides about work in group **P7 Inne** e.g. signal beep during pressing the key, contrast on the display etc..

8.7.1. Enter to group menu P7 Globals

Enter to submenu group **P7 Globals.**


10/11/01 Setup 13:47:56
P7 ▶01 Password 0
02▶ Prog. library 0 disabled
03 Beep 1 enabled
04 Language 1 English
05 Backlight 1 on
06 Brightness ******** function
07 Contrast ******** function
08 Analyzer Id 12564
08 Software rev. MBA 0.11
09 Par printout ******** function
10 Par. receive ******** function
11 ID setting ******** function
12 ID autoprint 0 off

8.7.2. Setup the parameters

Setting up the parameters can be realized the same as in previous menu groups.

01 Password
protection of the possibilities of entering set up the software

02 Prog. library
switch on/off access to the library with programs

03 Beep
decision if each key is signalling by beep signal on the analyzer keyboard

04 Language
select language in description of the parameters Polish or English

05 Backlight
backlight on the graphic display (backlight improves readability of the displays)

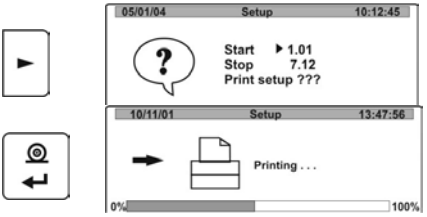
06 Brightness
changes brightness of display backlit - after enter to function by means of keys on keyboard it is possible to change brightness of display

07 Contrast
change the contrast on the display – after enter the function display appears and by means of keys change contrast on the display

08 Analyzer Id
information about factory number of the analyzer

09 Software rev
information about factory number of the analyzer

10 Parameters printout
activation this function causes printout set parameters in user's menu. User gives number of the parameters which are printed.



After enter into the parameter of printing display with question appears

After the confirmation starts printing through socket
RS 232 actual sent set parameters

11 Par. receive
Activation the function causes receive all parameters from computer through RS 232.
After enter the function display appears

After receive settings the analyzer informs user about how many parameters were accepted and changed and how many declared faulty and not accepted by the program. Printing and receive the parameters in very comfortable and fast way to introduce new settings. After printing actual parameters to file in the computer user changes the parameters fast and easily. Value of these parameters must be corrected and after record the changes in the file new corrected setting must be sent to the analyzer program. After recording changes in the parameters the analyzer accepts new settings. This procedure requires good knowledge of the parameters and computer operation.

12 ID setting
codes are introduced to the analyzer memory

13 ID autoprint
defines if code introduced in the analyzer memory is sent automatically through the socket RS 232

9. MAKING THE DRYING WITH USE OF SHORTENED MENU

This section provides you with essential information on making measurement In shortened procedures

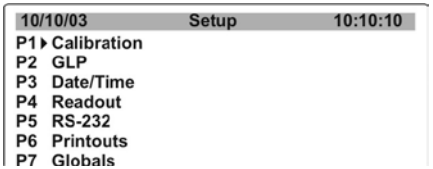
There are parameters to set up in menu procedure:

- Profile with parameters (temperature, time)
- Finish drying
- Displaying result
- Frequency of printouts

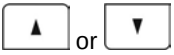
9.1. Way of shortened menu activation

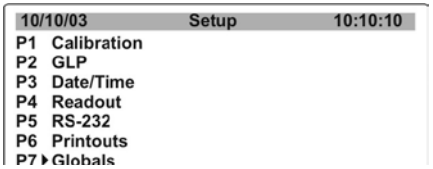
To use shortened procedures menu switch on P7 Globals in user's menu in parameter's group, parameter P7 02 data base of the programs (value „**0**").

Procedure:

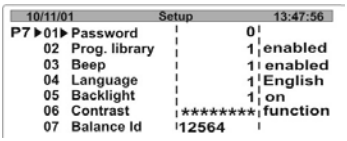


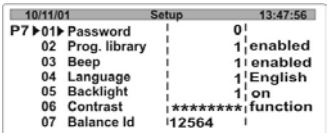
After pressing **Setup** key, window with parameters group is displayed.

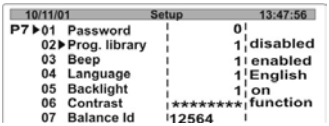




Using functional keys set cursor next to group of parameters P7 Inne.


10/11/01 Setup 13:47:56
P7 ▶01▶ Password 0
02 Prog. library 1 enabled
03 Beep 1 enabled
04 Language 1 English
05 Backlight 1 on
06 Contrast ******** function
07 Balance Id 12564

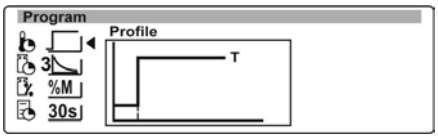

10/11/01 Setup 13:47:56
P7 ▶01▶ Password 0
02 Prog. library 1 enabled
03 Beep 1 enabled
04 Language 1 English
05 Backlight 1 on
06 Contrast ******** function
07 Balance Id 12564


10/11/01 Setup 13:47:56
P7 ▶01 Password 0
02▶ Prog. library 1 disabled
03 Beep 1 enabled
04 Language 1 English
05 Backlight 1 on
06 Contrast ******** function
07 Balance Id 12564

After move to main display of the program (with record changes in menu) user can realize drying without selecting the drying program. After set up the parameter P7 02 Programs Base on the value 0, user cannot use data base of drying programs recorded in the analyzer memory.

After pressing the key, software automatically moves to setting basic parameters of drying.

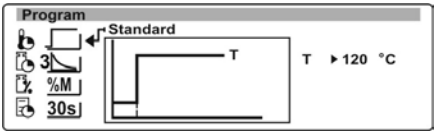
9.2. Way of setting the parameters



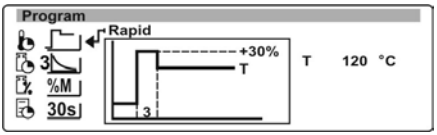
Press key **Test Menu**. A new display now appears with first view of shortened menu declaring parameters of drying.

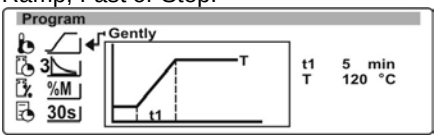
With navigation key activate selection of profile of drying (name of the program now appears above the picture and

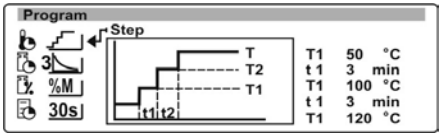
profile in up left corner of the display)



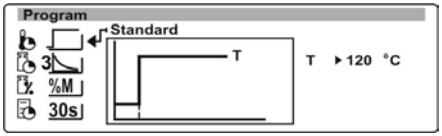
Press either up or down keys and scroll to the desired program: Standard, Ramp, Fast or Step.





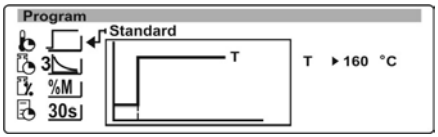


Press navigation key and set up the parameters of the program. Next to first of parameters black triangle appears on the display.



Activate parameter to change (it starts flashing)

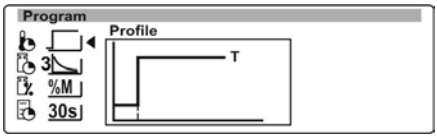
Press arrow keys and set up the value



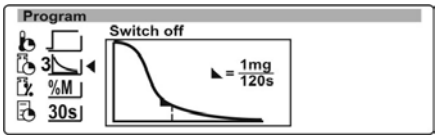
Confirm with ENTER key (value stops flashing).

If you selected ramp or step program set up other parameters. If you selected standard or fast program set up following steps of drying process .

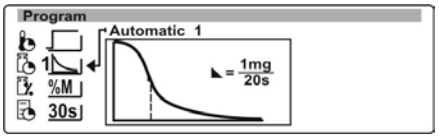
To set up other drying parameters press key ENTER. The moisture analyzer returns to first display.

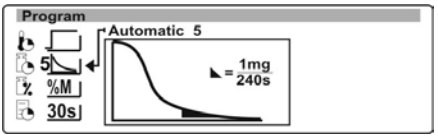


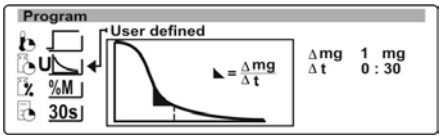
Press the down arrow key and scroll to the following option Finish.

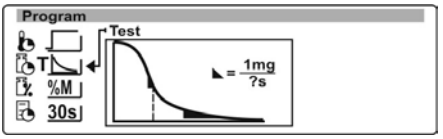


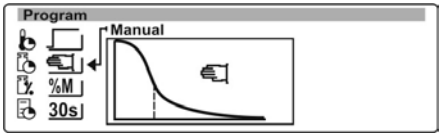
Press functional keys (selection of settings and change of the parameters the same as in previous version) and select program of finishing measurement and set up the parameters

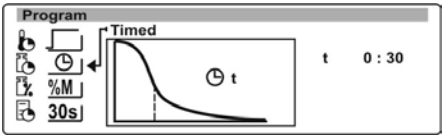






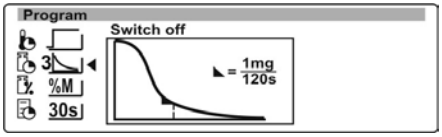




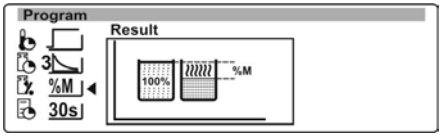


After setting way of finish move to setting of next parameters of drying process.

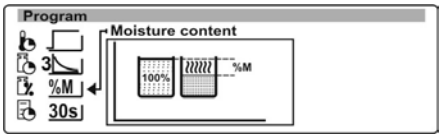
Press ENTER key to set up the other parameters. The moisture analyzer returns to first display

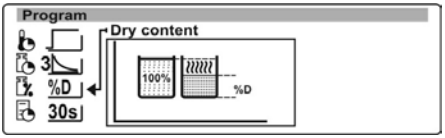


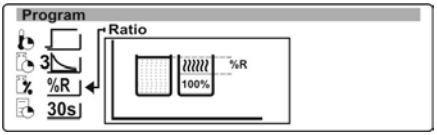
Press the down arrow key and scroll to the following option **Result**.

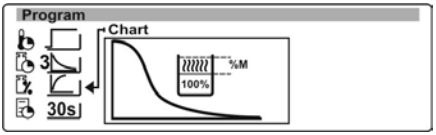


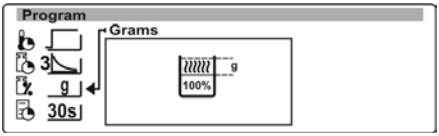
Press functional keys (selection settings and changes the parameters are done in the same way as in previous step) and select method of displaying result.



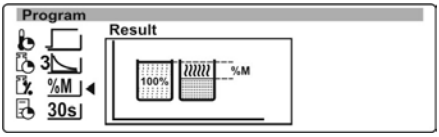




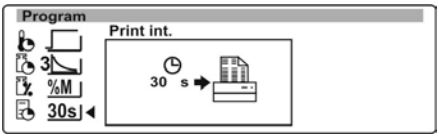




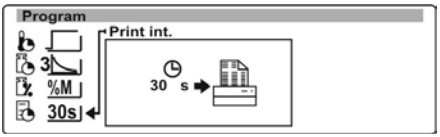
Press functional keys (selection settings and changes the parameters are done in the same way as in previous step) and select method of displaying result.

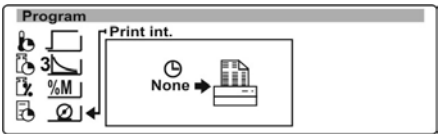


Press the down arrow key and scroll to following option **Printout time**

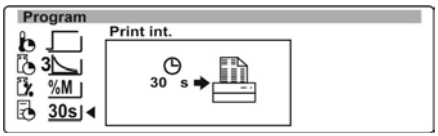


It is period of time in seconds. The moisture analyzer transfers present result to external device.





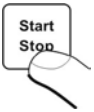
Perform the measurement after set up the printout
To finish setting up the parameters and determine moisture press ENTER key. The moisture analyzer returns to first display.



Press ENTER key once again. The moisture analyzer returns to main display on level you can determine moisture in the sample.

9.3. Way of performing the drying according to set values of shortened drying menu

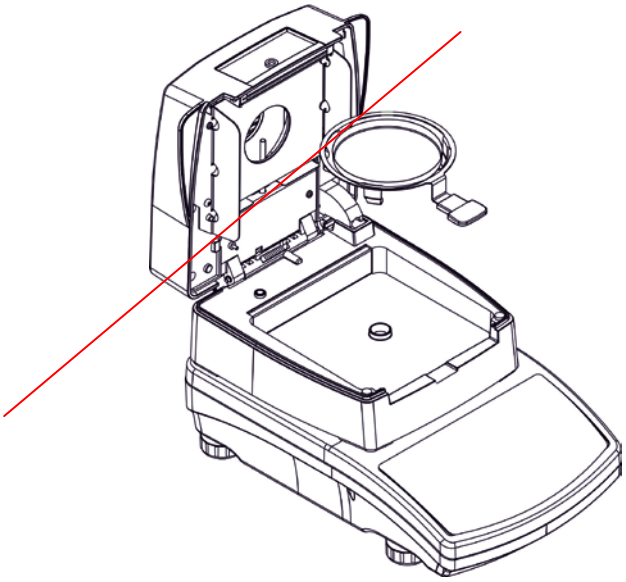
Adjustments for drying procedure are presented as pictographs at left side of the display



To start drying press the key

Start/Stop .
Program show following commands which enable to operate the instrument. Act according to them. It ensures correct preparation of the sample and testing the sample.
The moisture analyzer displays command to prepare the sample pan
Put the sample pan in the handler on the pan support.
Mass of the pan appears on the display.

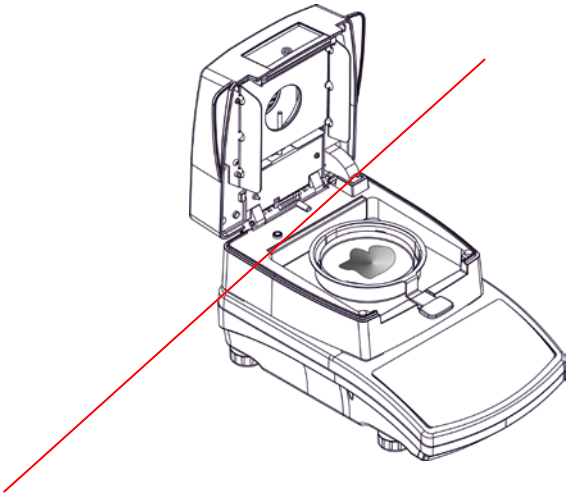
To ensure stable conditions



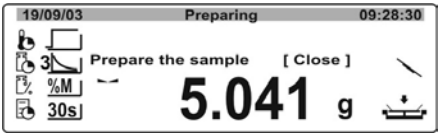
during tarring, closing the drying chamber is advisable.

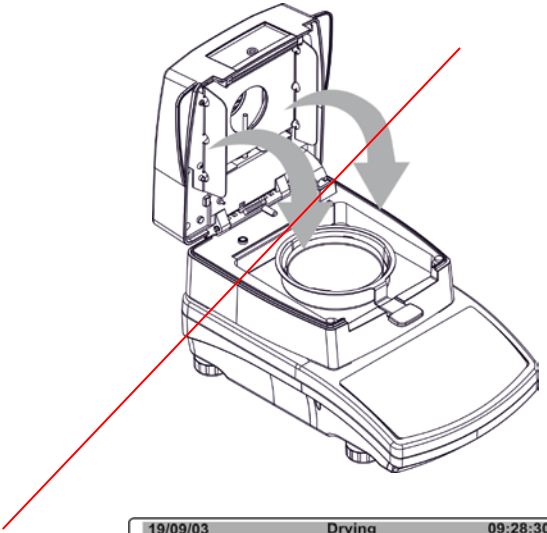
Press key ZERO/TARE and write sample mass to memory. This sets the moisture analyzer to zero. Next message will appear.

Place the specimen sample in



the sample pan. Sample mass must be picked after examinations and regarding to the quality of the examined substance

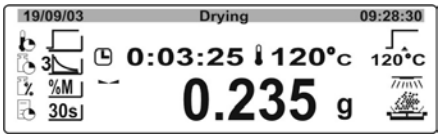




Close the drying chamber after pictograph appears on the screen. Drying starts automaticall y.

The moisture analyzer does the drying process in

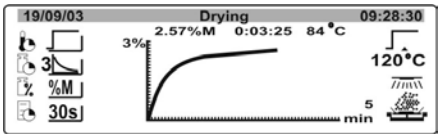
set parameters. Information about the process appear on the screen. Printout headline is sent to communicati on port RS232 (according to set options of printout – parameters group P6 Printouts).

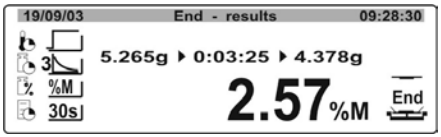


During drying actual results of the measurement and information about the process appears on the display (testing time, temperature in the chamber etc.).
During drying results are sent to communication port RS232 automatically of printout lines (according to set options of the printout– group of the parameters P6 Printouts), in set periods of time.

Display

Press DISPLAY key and switch between kind of displayed result.





After the measurement the summation of the test and final result appear on the display.
And footer is sent to communication port RS232 (according to set options – group of the parameters P6 Printouts).

10. DECLARING THE DRYING PROCEDURES AND USING THE PROCEDURES LIBRARY

In this section you will learn how to define new drying procedure and how to make a measurement in defined procedure remembered in the moisture analyzer memory. Each procedure contains:

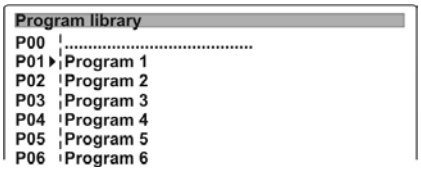
- Name
- Profile
- Dry Temperature
- Switch off
- Kind of displaying result
- Frequency of printing data
- Size of the sample
- Correcting factor

10.1. Defining the drying procedure

To use data base with recorded procedures switch on in user's menu in group of the parameters P7 Inne, parameter P7 02 Prog. library (value „**1**").
Switch on the parameter is described in point 8.7.2 of the manual.

Before start work with data base introduce data to the moisture analyzer. According to these data tests are done.

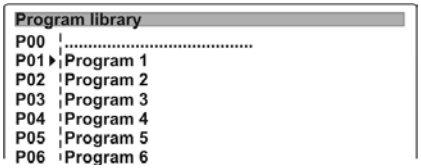
Way of entering to setting data in procedures:



Press key **TEST MENU** and display list of remembered procedures in memory
CAUTION:
In option P00 last program is displayed or program chosen for drying.

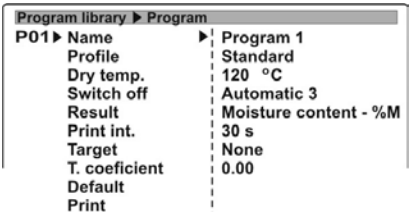
or

Press the arrow keys and replace the



arrow on list of programs.

To activate program data press navigation key.



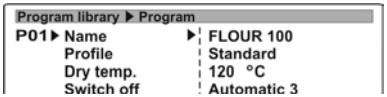
After pressing the key, window with saved data in chosen program will be displayed.

According to described way of moving in menu and making the changes in settings, enter required parameter changes. Setting the parameters must ensure correct process and reliable results of measurement.

10.2. Writing in name of software

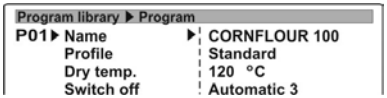
Name enables to identify and use the program easily depending on tested substance. It can contain 12 alphanumerical signs.

Method of entering the name:



Indicated by black arrow parameter can be changed

Press navigation key and activate edition field to change. First sing of the new name starts flashing.



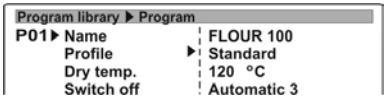
Using functional keys or PC keyboard write the new name of the program e.g. name of the substance.
If you write new sign the flashing sign disappears.
Confirm new name and press ENTER.
Last sign stops flashing

After write the new name set following parameters of the program.

10.3. Selection of drying profile

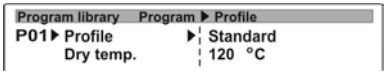
There are four programs available when the moisture analyzer is running a test: standard, fast, ramp, step. In each of these programs parameters are referred to (drying temperature and time needed to achieve set temperature). The program must be selected according to examined substance. Selection of the program is described in further section of the manual.

Way of setting the profile:



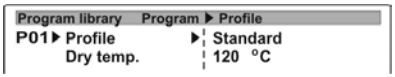
Press the down arrow key and replace black arrow next to parameter **Profile**

Press navigation key and move to next display

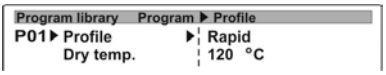


Using functional keys or PC keyboard select the profile. Select the profile according to described method of moving in user's menu

After selection suitable profile set up the other parameters– drying temperature and time according to data for chosen profile.

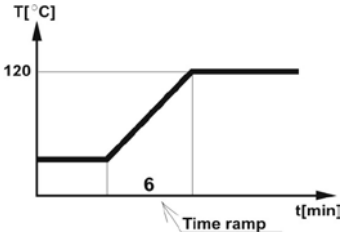


In standard profile set up drying temperature.



Program library	Program ▶ Profile	
P01	Profile	▶ Gentle
	Ramp time	5 min
	Dry temp.	120 °C

In ramp profile set up the drying temperature and period of time to achieve set temperature .



Program library	Program ▶ Profile	
P01	Profile	▶ Step
	Temperature 1	50 °C
	Time 1	3 min
	Temperature 2	100 °C
	Time 2	3 min
	Dry temp.	120 °C

In step profile set up the temperatures of the level „**1**" and „**2**" and drying temperature and periods of heating in following average temperatures.

After set up profile and the parameters move to programming following parameters of the program.

10.4. Setting the drying temperature

The drying temperature is repeated parameter of setting option **Profile**.

Procedure:

Program library ▶ Program		
P01	Name	FLOUR 100
	Profile	Standard
	Dry temp.	▶ 120 °C
	Switch off	Automatic 3

Press the down arrow key and replace black arrow next to parameter **Dry temperature** Drying temperature

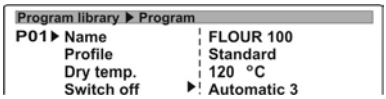
Using functional keys of moisture analyzer Or PC keyboard set required value of temperature. Setting can be made according to previously described way of moving in user menu.

After setting and saving new value of temperature, this temperature will be also inserted in profile settings as valid one.

10.5. Setting method of switch off drying

Switch off can be:
- Automatic 1 (change 1mg/10s)
- Automatic 2 (change 1mg/25s)
- Automatic 3 (change 1mg/60s)
- Automatic 4 (change 1mg/90s)
- Automatic 5 (change 1mg/120s)
- Time defined (max. time 9h 59min.)
- Manual (after pressing the key)
- Defined (give change of mass Δm 0,1-9,9mg and change of time Δt max 2,55 sec.)
- Test (enables choice of parameters for auto-switch off for sample)

Procedure:



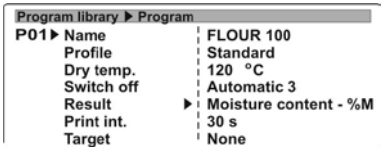
In menu press the down arrow key and replace the black arrow next to the parameter **Switch off**.

Criteria of setting are described in see point 9.2.

10.6. Setting type of displaying and printing results

User can define kind of the printout during the tests. One of four method can be selected: %M, %D, %R, g.

Procedure:



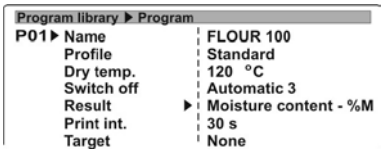
Press the down arrow key and replace the black arrow next to the parameter **Result**.

If you select option „**Chart**" „Scheme" result **%M** appears.

10.7. Setting time of printout

This parameter defines frequency of sending result during determining moisture.

Procedure:



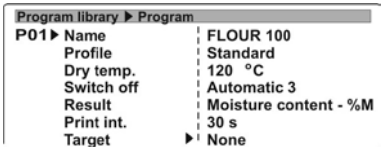
Press the down arrow key and replace black arrow next to the parameter **Print int**.

If you select option „**Chart**" „Scheme" result **%M** appears.

10.8. Setting size of tested sample

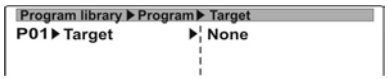
Parameter defines mass of the sample. User chooses one of three options: lack, necessarily, optionally.

Procedure:



Press the down arrow key and replace black arrow next to the parameter **Sample**.

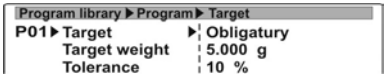
Press navigation key and move to following display to choose option.



Using functional keys or PC keyboard select the suitable. Select them according to described method in user's menu
After selection suitable profile set up other parameters – drying temperatures and time according to displayed data for selected profile.

In option **Optional** set up sample mass and tolerance of this mass

If you choose this mass the moisture analyzer informs user to put suitable amount of substance on the pan. In other case the instrument starts testing the sample even if its mass is not compatible to settings.



In option **Obligatory** set up sample mass and tolerance for this mass

If you select option program the moisture analyzer informs user to put suitable amount of substance on the pan. In this option program does not start testing sample until settled amount of substance is on the pan.

10.9. Setting correction factor

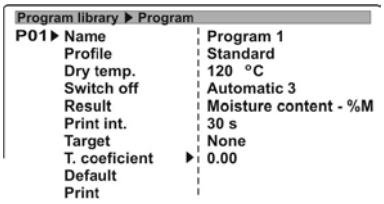
Dark color substances absorb heat. The sample can be overheated and if the temperature is 120 ^{o}C dark color sample absorbs heat and reach temperature about 135 ^{o}C. In these cases define correcting factor of drying temperature. Defining this factor is done by means of additional equipment – set with the control thermometer and probe.

T. coefficient:

1. Program all parameters of drying
2. Distribute sample evenly and start drying process
3. After testing note the result
4. Take second sample and distribute it in thicker coating
5. Slip the probe through the cover and dip it in the sample, press ON/OFF key on the control thermometer
6. Start drying process
7. Check temperatures on the keyboard and control thermometer
8. After period of time for first sample read out two values
9. Count factor according to formula:

$$\frac{T_{measured} - T_{set}}{T_{set}}$$

Setting the parameter:



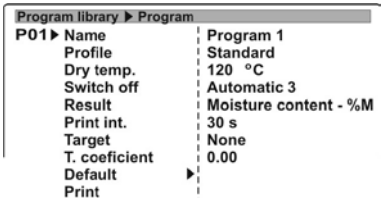
In the menu press the down arrow key and replace the black arrow next to the parameter **T. coefficient**

By means of functional keys of the moisture analyzer or PC keyboard select value of the factor. Set up according to user's menu.

10.10. Default settings of program

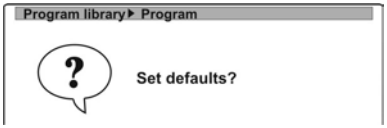
Parameter enables setting all parameters as default determined by programmer.

Method of setting parameters as default:

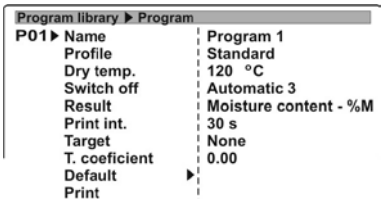


In the menu press the down arrow key and replace the black arrow next to the parameter **Default**.

If you press navigation key command to confirm chosen function to restore default values appears.



Pressing the ENTER key will set up all parameters of the program for primary values and return to main display.

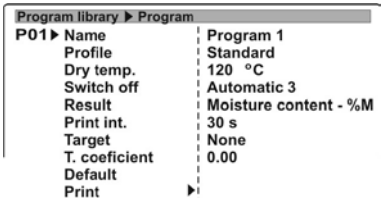


Pressing Esc key will make resignation and returns to previous display without any changes.

10.11. Settings printout

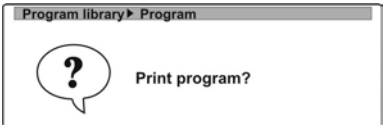
Parameter enables printing of inserted program settings on connected printer.

Procedure:



Press the down arrow key and scroll to parameter **Print** in menu.

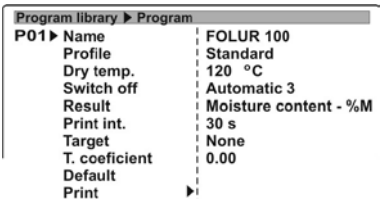
Press navigation key to display command with the question.



Press **ENTER** key to print all parameters and return to previous window.

------- Program parameters ------

Program number	**: 1**
Name	**: FLOUR 100**
Profile	**: Standard**
Dry temp.	**: 120 °C**
Switch off	**: Automatic 3**
Result	**: Moisture content %M**
Print int.	**: 30 s**
Target	**: None**
T. coeficient	**: 0.00**

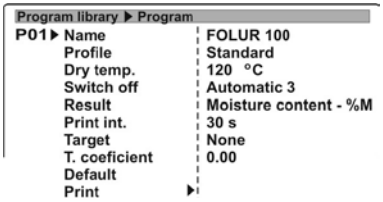


Pressing **Esc** key will not print the parameters. The software returns to previous display without any changes.

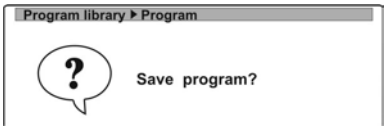
10.12. Settings record to moisture analyzer memory

Remember that all changes of the parameters are recorded in transitory memory of the instrument. To record them permanently return to main display and use procedure of record.

Procedure:

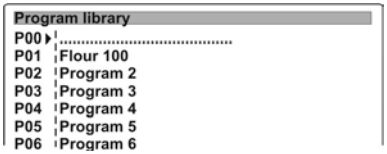


Press **Esc**.

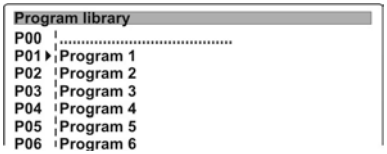


The software displays command with the question for the operator..

Pressing the **ENTER** key will record the changes and display the library.



Pressing the **Esc** key will display the library without the changes.



11. USING THE LIBRARY

To accelerate test user can select program from the library of the instrument and do not have to set up parameters of drying for each substance separately. User selects

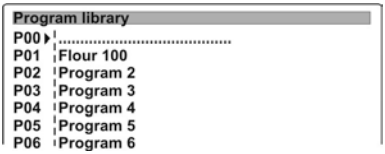
profile with settled parameters in the library (e.g. name of dried product) without necessity of changing it if other sample is selected.

CAUTION:

To use data base with procedures during determining moisture set up in user menu in group of parameters P7 Inne, parameter P7 02 Prog. library (value „1”).
Procedure of turn parameter on is described in point 8 of instruction.

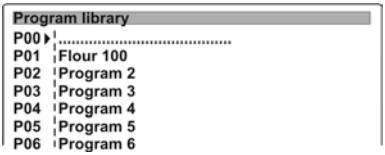
PROCEDURE:

Press **Test Menu** key.



The program list is displayed.

Press either up or down arrow keys and scroll to desired option of program.



Press key **ENTER** and return to main screen. The moisture analyzer is ready to work. All of the parameters associated with the test selected are now available to be run again. You do not have to enter any new data.

In top part of the screen name of the program and number appear. At the left side pictographs of parameters appear on the screen.

Further procedure is the same as for test in short drying menu (see point *9.3 of instruction manual*).

12. PREPARATION OF SAMPLE FOR DRYING

This section provides you with essential information on optimum results during tests. In this section rules of how to select parameters of drying depending on kind of substance are presented.

12.1. Moisture measuring in moisture analyzer

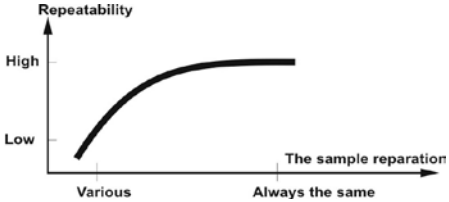
During heating the sample loses its mass (evaporates). The moisture is measured.
The RADWAG moisture analyzer contains 2 parts: precise analyzer and drying chamber. Measurement in halogen moisture analyzer is faster and no additional calculations need to be done (the result is displayed during test).
Independently of method of determining moisture also sample preparation and selection suitable parameters of test have special influence.

- Sample size
- Kind of substance
- Drying temperature
- Drying time

Speed of measurements can be enlarged after optimum setting parameters of the instrument depending on examined substances.
Optimum **temperature** and **drying** depends on kind and size of sample and expected precision of measurement. **The selection of these parameters can be done after experimental tests.**

12.2. Sampling and sample preparation

Characteristic, preparation and size of the sample are all important contributing factors in increasing speed and quality of the measurement process.
Sampling and the sample preparation have a great influence on the reproducibility of the measured units. It is also important that the sample being investigated is a representative part of the total amount of the sample under test.



The final result of a moisture determination depends on a carefully thought out sample preparation. The part of sample used for analysis must be representative of the total quantity. The sample preparation includes work processes such as sampling, sample division, size reduction, homogenization and others. All of these processes should be carried out as quickly as possible and without loss or uptake of moisture.

The appropriate standards and directions must be consulted to determine the method of sampling as this is depended upon the product, consistency and the amount used.

Number of samples
An increase in the number of samples always lead to an improvement in the statics reliability of the analysis results. The size depends on the homogeneity of the test material, the accuracy of the test material, the accuracy of the measurement method and the desired accuracy of the measurement result.

Mechanical size reduction
Sample division is usually accomplished by specific types of mills influenced by the sample characteristics. Hard, brittle samples are mainly reduced in size by pressure, impact or friction action, cutting action. Whatever the operating principle of a mill may be for subsequent moisture determination there must be no loss of moisture during the milling operation. The quantitative recovery of the mill chamber should also be simple and complete.

Use of quartz sand
To ensure an optimum drying process samples should always have as large an area as possible. Results of substances which form crusts (e.g. glucose syrup) or pasty substances (e.g. butter) can be considerably improved by mixing with quartz sand. Sample pans with a large volume and relatively high walls are needed for this.

Pasty, fat-containing and melting substances
For pasty, fat containing and melting substances, use a glass fibre filters is advantageous to increase the surface area of the sample. The liquid contained in the substance is uniformly and extensively distributed in the interstices between the fibres throughout the available area. Pre-drying of the glass fibre filter and storage in a desiccators is necessary only for highly precise measurement results.

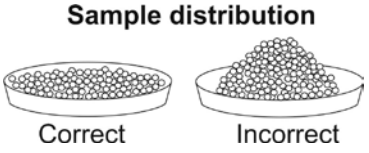
Liquid substances
Liquid substances often tend to form drops on the sample pan owing to the surface tension of the liquid. The use of commercial glass fibre filter shortens the drying time. The glass fibre filter distributes the liquid sample over which wide area as result of its absorbent action. Pre-drying of the glass fibre filter and storage in which desiccators is necessary only for highly precise measurement result.

Skin-forming and temperature sensitive substances
The use of a glass fibre filter can be useful for temperature-sensitive and skin forming substances. In this case the sample to be dried is covered by the filter and receives a "new surface". This shields the surface of the sample against direct IR radiation. Gentler heating of the samples is based on convection rather than on IR radiation.

Sugar-containing substances
Samples containing a large amount of sugar tend to caramelize on the surface. In such cases, ensure thin laser is applied. Also select a moderate temperature.

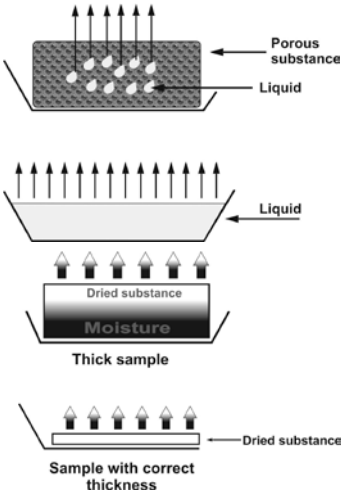
Sample application on drying pan

Loose materials
They are dried in natural form. Decomposition of the sample reduces smaller dispersions between following measurements. Sample mass cannot be too big. Ensure application of a thin and uniform layer thickness.



Liquids
Semi-liquid substances are dried in natural form. Big amounts of fat in some substances hampers procedure of determining moisture. In such cases use additional components (e.g. quartz sand, tissue-paper, filter). Before the actual drying dry additional components in order to minimize their moisture.

Solids
Depending on structure of solid (dense or loose) determine moisture is faster or flower. Size of solid surface decides about speed of drying and reliability of measure. The surface of solid should be the biggest as it is possible. Because solids



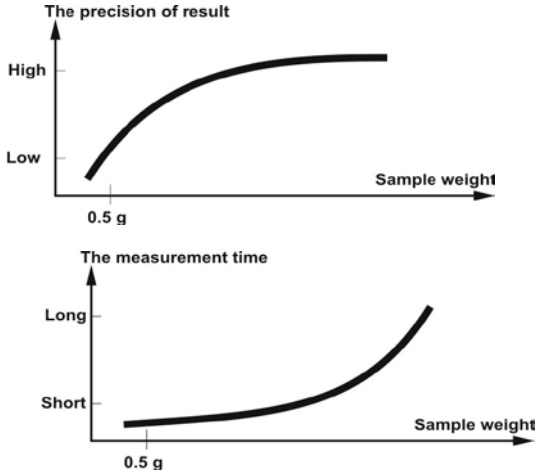
evaporates moisture by external surface also thickness of sample is very important.

13. SELECTION OF DRYING PARAMETERS

13.1. Selection of optimal mass sample

The sample weight has an influence on both the accuracy of the measurement results and the measurement time. With large amounts of samples, a great deal of water must vaporize and the moisture determination takes longer.

To keep the measurement time as short as possible we advise you choose a low weight sample but not so low that attainment of the required measurement accuracy is no longer possible.



13.2. Influence of sample mass on results repeatability

Sample weight influences the repeatability of the moisture analyzer. The relation between sample weight and repeatability is shown in the following.

Sample mass	Repeatability
0,5g	±0,6%
1g	±0,3%
2g	±0,15%
5g	±0,06%
10g	±0,03%

The preceding table is based on the assumption that the sample is ideal, homogeneous and its moisture can always be separated completely and free from decomposition (e.g. moist quartz sand).

Deviations always comprise the uncertainty which depends on the sample and the repeatability of the instrument. In practice, measurement differences appearing within a measurement series can consequently be larger than the values of the halogen moisture analyzer shown in the table.

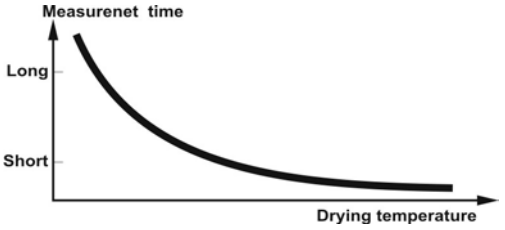
13.3. Drying temperature

The drying temperature exerts a controlling influence on the measurement time. Value depends on kind of the material. Too low temperature causes evaporation of water partly and extension of drying time unnecessary. Too high drying temperature causes combustion of material (chemical decomposition, overheating the sample). Drying temperature is determined by norms. If not the temperature must be determined experimentally.

The following procedure is suggested for selecting the temperature:

- Estimate moisture content of the sample
- Determine the decomposition temperature of the sample by experiments
- Compare the measurement result with the reference method if one exists

With samples which have a high moisture content it is possible to shorten the measurement time by selection of the step or rapid drying program. Here, the greatest part of the existing moisture is separated at an elevated temperature.



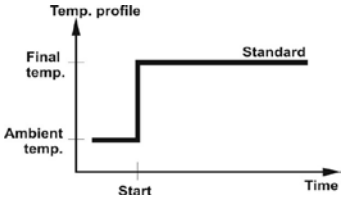
The drying temperature is then lowered and kept constant until the end of drying.

13.4. Selection of the drying program

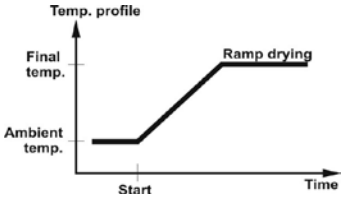
There are four programs which control the temperature profile:

- Standard drying program
- Fast drying program
- Ramp drying program
- Step drying program

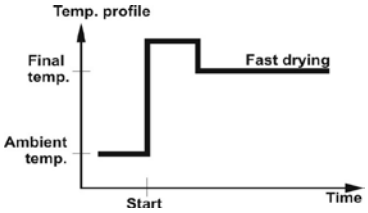
STANDARD profile
Standard drying is suitable for precise determination of the moisture content of most substances. It is the most often used profile of drying.



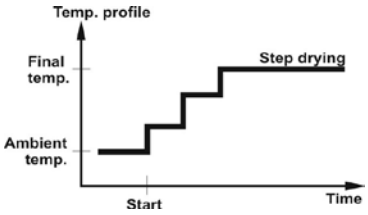
RAMP profile
Ramp drying is selected if substances are not stable on exposure to the full heating power of the halogen radiator of the start. In ramp drying sensitive samples are prevented from decomposition by the gentle heating. Ramp drying can also be used successfully with substances which form a skin.



FAST profile
The fast drying profile is suitable for samples with a moisture content between 5% and 15%. In fast drying the radiator power exceeds the set temperature value during the first minute following the start of drying. This compensates the endothermic heat of vaporization and accelerates the drying process. The sample must contain sufficient moisture during the first minute to cool it.



STEP profile
The step drying has a use similar to that of fast drying. The duration of excessive temperature stage and the temperature value are freely selectable. It is used primarily with samples with a moisture content greater than 15%.



13.5. Selection of drying time

Drying time is determined by choose suitable criterion of drying. A switch-off criterion is understood to mean the condition which must be met for the moisture analyzer to switch off automatically and the drying.

The automatic switch-off is after settled time independently of loss of mass. It is used for substances which decomposes and their mass is not stable.

The second type recognizes the end of drying automatically. The integrated analyzer continuously determines the weight loss of the sample during drying. If the weight loss (less than 1 mg) per unit of time is less than the set level, the drying is stopped and the final result is displayed.

Automatic switch-off

User has possibility of few types of drying switch-off. Switch-off can be:

- Automatic 1 (change 1mg/10s)
- Automatic 2 (change 1mg/25s)
- Automatic 3 (change 1mg/60s)
- Automatic 4 (change 1mg/90s)
- Automatic 5 (change 1mg/120s)
- Time defined (max. time 9h 59min.)
- Manual (after pressing the key)
- Defined (give change of mass Δm 0,1-9,9mg and change of time Δt max 2,55sec.)
- Test (enables choice of parameters for auto-switch off for sample)

Auto switch-off – free defined criterions

The auto switch – off criterion is based on a user defined mean weight loss per unit of time or a user defined mean %M loss per unit of 60s. As soon as this drops below the present value, the measurement is automatically ended.

Manual switch-off

With this switch-off criterion, the measurements process continues until you stop it with the keys **START/STOP**.

Timed switch-off

With this switch-off criterion, the measurement lass until the present drying time has elapsed.

13.6. Analysis of drying profile

In the first type, the drying profile is asymptotic. The amount of moisture lost assumes a constant value and no longer changes after drying time.
With this drying profile, repeatable determinations of the moisture content are always simple.

The measurement result then corresponds exactly to the constant value of the asymptote. It is also correspondingly easy to find a suitable switch-off criterion.

In the second type, drying runs quickly at the start and then flattens out. The moisture content never assumes a constant value. The causes of such a drying profile can be as follows:
The sample exhibits thermal decomposition, the decomposition products other volatile components can lead to superimposed profiles owing to their slower vaporization than water. The difficult to volatilize components lead to a slow, continuous decrease in weight.

Measurements results of such a drying profile can be optimized:

- Lowering the temperature can slow down the decomposition reaction
- The selection of a suitable switch-off criterion can allow recognition of the end of the analysis at the desired break point of the drying curve
- The selection of a constant drying time often provides good measurement results.
- Keep the initial weight of the sample constant (+10%....+20%).

14. COOPERATION WITH PRINTER OR WITH COMPUTER

Printing to an external printer or computer will occur each time the **PRINT** key is pressed. Signal with present presentation with measurement units on display is sent to computer or printer. The speed of transmission is set up for 9600 bit/s. If external device (printer, computer) needs different speed of transmission change parameter of speed in the menu (see point 13 in instruction manual).

14.1. Schemes of connection cables

Analyzer socket DB 9/F – printer KAFKA socket WM 560

3 (TxD)	**1** (RxD)
5 (GND)	**3** (GND)
7- 8 zwarte	

Analyzer socket DB 9/F - computer socket DB 9/F (if there is no control of sending data)

2 (RxD)	**3** (TxD)
3 (TxD)	**2** (RxD)
5 (GND)	**5** (GND)
4 - 6 closed	**4 - 6** closed
7- 8 closed	**7 - 8** closed

Analyzer socket DB 9/F - computer socket DB 9/F (and control sending data)

2 (RxD)	**3** (TxD)
3 (TxD)	**2** (RxD)
4 (DTR)	**4**
5 (GND)	**5** (GND)
6 (Tara)	**6**
7 (RTS)	**7** (CTS)
8 (CTS)	**8** (RTS)
9 (Print)	**9**

Analyzer socket DB 9/F - computer socket DB 25/F

2 (RxD)	**2** (TxD)
3 (TxD)	**3** (RxD)
5 (GND)	**7** (GND)
7 - 8 closed	**4 - 5** closed
	6 - 20 closed

15. LIST OF COMMAND COMPUTER – MOISTURE ANALYZER

Function **RESET INTERFACE**
Command **R CR LF** (zero current made commands and return to factory setting)

Function **SEND ALL COMMANDS FROM THE INSTRUMENT**
Command **PC CR LF** (sends information about all commands in the program from the instrument)

Function **SEND THE RESULT IN BASIC UNIT**
Command **S CR LF** (sends result in basic unit after stability from the instrument)

Function **SEND THE RESULT IN BASIC UNIT IMMEDIATELY**
Command **SI CR LF** (sends result in basic unit from the instrument)

Function **SEND THE RESULT IN CURRENTLY USED UNIT**
Command **SU CR LF** (sends the result in current used result after stability)

Function **SEND THE RESULT IN CURRENTLY USED UNIT IMMEDIATELY**
Command **SUI CR LF** (sends the result in current used unit from the instrument)

Function **SET THE MOISTURE ANALYZER TO ZERO**
Command **Z CR LF** (set to zero the instrument after stability)

Function **SET THE MOISTURE ANALYZER TO ZERO IMMEDIATELY**
Command **ZI CR LF** (set to zero the instrument immediately after send command if it is possible in this moment)

Function **TARE IF IT IS STABLE**
Command **T CR LF** (set to zero the moisture analyzer after stability)

Function **TARE IMMEDIATELY**
Command **TI CR LF** (tare the instrument immediately after sending the command if it is possible in this moment)

Function **TARE THE INSTRUMENT IMMEDIATELY**
Command **TI CR LF** (tare the instrument immediately after sending command if it is possible in this moment)

Function **SWITCH ON CONTINUOUS TRANSMISSION IN BASIC UNIT**
Command **C0 CR LF** (break continuous transmission in basic unit)

Function **SWITCH ON CONTINUOUS TRANSMISSION IN BASIC UNIT**
Command **C1 CR LF** (start continuous transmission in basic unit)

Function **GIVE THE NUMBER OF THE INSTRUMENT**
Command **NB CR LF** (send factory number)

Function **GIVE THE RANGE OF WEIGHING**
Command **FS CR LF** (send value of max capacity in basic unit by the instrument)

Function **GIVE THE VERSION OF THE SOFTWARE**
Command **RV CR LF** (sends name of the program)

Function **GIVE OR CHANGE DATE IN THE INSTRUMENT**
Command **PD CR LF** (sends date and changed date)

Function **GIVE OR CHANGE TIME IN THE INSTRUMENT**
Command **PD CR LF** (sends settled time and changed time)

Function **GIVE CURRENT WORK MODE**
Command **PM CR LF** (sends code of current work mode)

Function **DISPLAY SETUP**
Command **PS CR LF** (sends all setup – printout of the parameters)

Function **SIGNAL – „BEEP“**
Command **B CR LF** (signal beep in the instrument)

Function **SEND LAST ERROR CODE**
Command **ER CR LF** (sends last code in the instrument)

Function **DISPLAY HEADLINE**
Command **DH CR LF** (sends in headline „upper bargraph“ on the display series of sings)

Function **CANCELL HEADLINE**
Command **CH CR LF** (cancel „upper bargfaph“ in the headline)

Function **MAKE INTERNAL CALIBRATION**
Command **CL CR LF** (starts internal calibration)

Function **BLOCK THE KEYBOARD**
Command **KL CR LF** (blocks the keyboard)

Function **UNBLOCK THE KEYBOARD**
Command **KU CR LF** (unblocks the keyboard)

Function **SWITCH OFF THE „ECHO“ OF THE KEYBOARD**
Command **E0 CR LF** (switches off sending codes of the keys)

Function **SWITCH ON THE „ECHO“ OF THE KEYBOARD**
Command **E1 CR LF** (switches on sending codes of the keys)

Function **SWITCH OFF THE INSTRUMENT**
Command **O0 CR LF** (switches off the moisture analyzer – the same as usage ON/OFF)

Function **SWITCH ON THE INSTRUMENT**
Command **O1 CR LF** (switches on the moisture analyzer – the same as usage ON/OFF)

Function **SWITCH OFF THE AUTOZERO**
Command **A0 CR LF** (switch off autozero)

Function **SWITCH ON THE AUTOZERO**
Command **A1 CR LF** (switch off autozero)

Function **GIVE OR CHANGE ID**
Command **ID n CR LF** (the moisture analyzer sends settled code or change this code) *n=1 ÷ 6*

Function **SEND THE PRINTOUT NUMBER n**
Command **PP n CR LF** (the moisture analyzer sends programmed printout with number n) *n=0 ÷ 4*

Function	**GIVE OR CHANGE VARIABLE NUMBER n**
Command	**V n CR LF** (the moisture analyzer sends variable or change variable with number n) *n=0 ÷ 4*

Notice!

*Sending command to the instrument which is not in the list or has an error and it is finished with CR LF, back sending the command in form. If there is no command in the list or has an error and it is finished the command is returned in **E S CR LF.***
Spaces should be omitted.

16. GUIDELINES OF USAGE

Measurement moisture of various substances in comparison to traditional method (weighing - drying - weighing - counting) is much faster and easier. It is different method of measure which needs individual (for each substance) selection of the parameters:

- temperature of drying,
- sample mass
- time of drying

If series of measurements are made in the same temperature first result should be omitted. The first measurement sometimes has an error because of thermal stabilization of drying chamber and the moisture analyzer.

The sample should be distributed evenly on all of the surface, coarse-grained substances must be disintegrated before the measurement.

For substances which evaporate water set up short time of sampling. For the substances which evaporate water slowly select the time experimentally.

If you test the substance which covers impervious coat use sand or tissue paper during drying.

ADDITIONAL EQUIPMENT OF ANALYTICAL BALANCES

1. Anti-vibration table

2. Thermal printer

- ✓ **KAFKA,**

3. PC keyboard, type PS/2

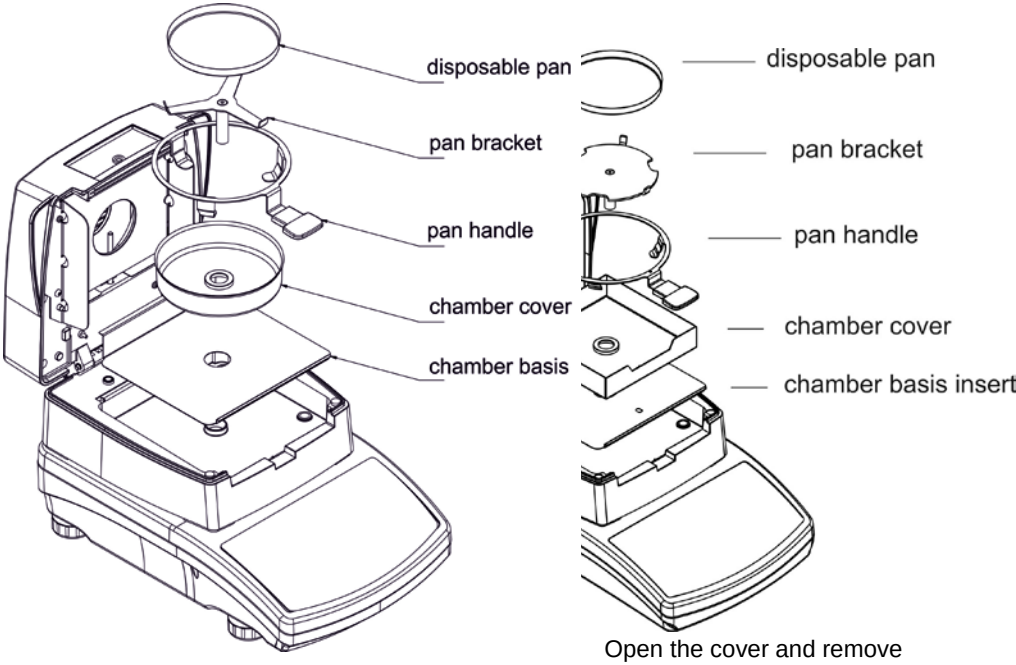
17. CARE AND MAINTENANCE

In this section you will learn how to keep your moisture analyzer in good condition and how to replace expendable parts. (halogens, safety-valve).

17.1. Components cleaning of moisture analyzer

To continue to obtain precise measurements it is advisable to clean the interior components at regular intervals. Please note the following instructions for cleaning your instrument.

Remember to disconnect the instrument from the power supply before cleaning.



Open the cover and remove all components: disposable pan, the pan handler, and cross draft shield.

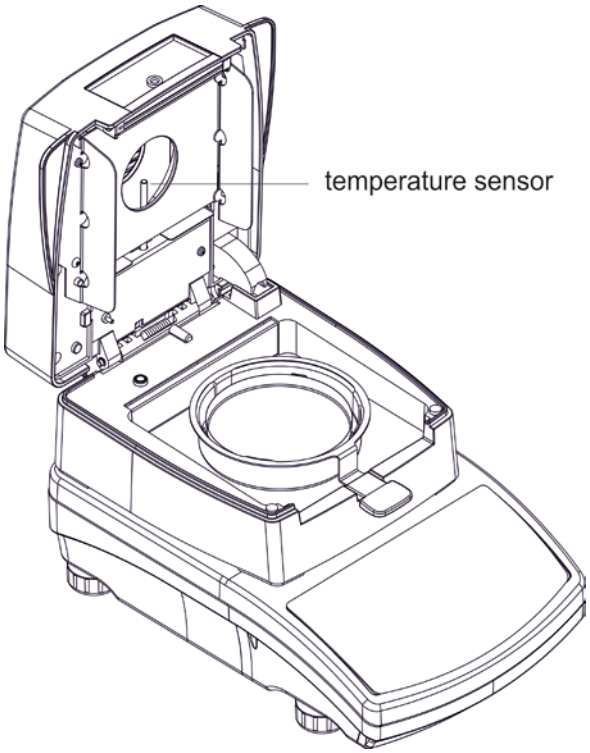
Use a lint-free cloth for cleaning (tetra, chamois leather etc.)and mild cleaning agents. Although the housing is extremely rugged and resistant to solvents, never use abrasive cleaning agents or solvents.

After cleaning dry all subassemblies.
Do not let any dirt or liquids to interior of moisture analyzer.

Ensure that no liquid enters the interior of the instrument. Replace the components after cleaning according to shown scheme.

Cleaning the temperature sensor.

To ensure correct measurements pay attention to cleanness of temperature sensor. Clean the instrument with taking all precautions. To clean it use smooth cloth and mild. Do not use abrasive materials and dissolvent. It can damage the sensor.

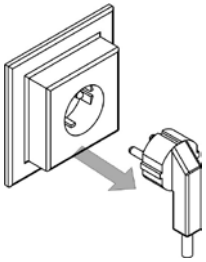


Do not touch the halogen and do not damage them.

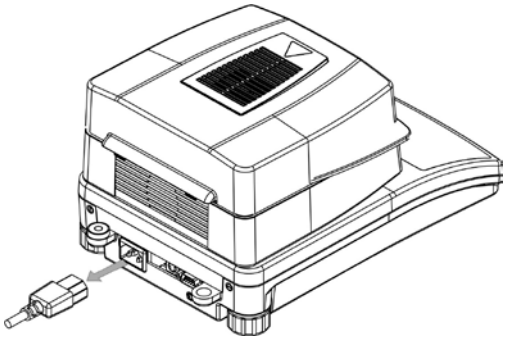
If it necessary halogen covers can be also cleaned. Clean with using only soft and textiles. Do not touch the filaments.

17.2. Replacement of fuses

After plug the moisture analyzer in autotext pictograph appears on the display (no reaction on the display) one of the fuses may be burnt.

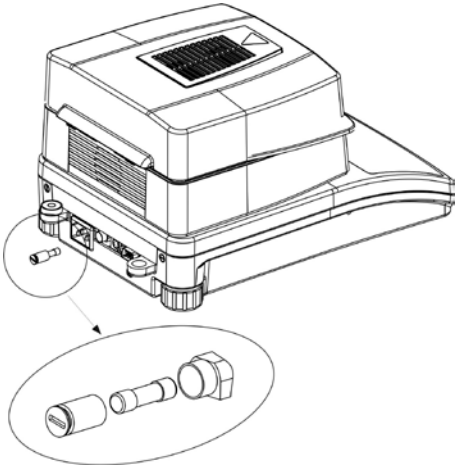


Remember, before start any repairing especially exchange the fuse plug out the moisture analyzer.



The moisture analyzer is equipped with two fuses.

Before start exchange take power cable off at the rear of the casing.



Tabular fuse ZKT 3.15A T4L 250V protects electronic systems of moisture analyzer.

Replacement of fuse:

1. Screw out the fuse socket from mounting.
2. Remove fuse from socket.
3. Replace the fuse for new one.

4. Screw in socket with new fuse.

17.3. Troubleshooting

Problem: display remains dark after switching ON
Probable causes: - no line voltage
- power cable not connected
- power line fuse blown
- instrument faulty

Problem: the measurements takes too long.
Probable cause: - you have selected an unsuitable switch-off criterion. Try experimentation to arrive at a suitable switch-off criterion.

Problem: The measurements are not repeatable
Probable causes: - The samples are not homogeneous i.e. they have different compositions. The more inhomogeneous a sample the larger the amount of sample needed to obtain a repeatable result
- The drying time is too short. Extend the drying time, select a suitable switch-off criterion.
- You have selected a temperature that is too high and the sample has oxidized. Lower the drying temperature.
- The sample boils. Lower the drying temperature.
- The temperature sensor is contaminated or faulty. Clean the temperature sensor.
- The support on which the instrument is standing is not stable. Use a stable support.
- The surroundings are very unstable (vibrations, draughts etc.). Change the surrounding into suitable.

17.4. Error detection

The moisture analyzer utilizes a suitable command on graphic display to indicate an error. Command has error number and short description of the reasons of error.

List of errors in moisture analyzer:

Command on display	*Error number*	*Error description*
"Error of control sum"	**1.1**	Error in data transmission.

"Error A/D"	**1.2**	Converter error.
Error 1.3 AD Th L	**1.3**	Number of A/D divisions from the thermometer in the drying chamber = 0 temperature sensor defected, heating process of the drying chamber will not be initiated, return to weighing mode by pressing ESC key
Error 1.3 AD Th H	**1.3**	Number of A/D divisions from the thermometer in the drying chamber = 1024 temperature sensor defected, heating process of the drying chamber will not be initiated, return to weighing mode by pressing ESC key.
Error 1.3 AD Tc L	**1.3**	Number of A/D divisions from the thermometer of the solenoid actuator = 0 temperature sensor defected, return to weighing mode by pressing ESC key.
Error 1.3 AD Tc H	**1.3**	Number of A/D divisions from the thermometer of the solenoid actuator = 0 temperature sensor defected, return to weighing mode by pressing ESC key.
"Exceed range"	**2.1**	Transgression max measure range of the instrument
"Exceed range"	**2.2**	Transgression max measure range of the instrument
"A/D Null"	**2.3**	No divisions of converter
"A/D Full"	**2.4**	Transgressed max amount of divisions of the converter
"Tara/Zero outside the range"	**2.5**	Transgression admissible value zero or tare range for the instrument.

"Tare outside the range"	**2.6**	Transgression admissible value tare range for the instrument
"Result > 10% Max"	**2.7**	Difference of values of initiative zero above ±10%, of factory value (check after start zero).
"Result > 4% Max"	**2.8**	Difference between start mass (pan, handler etc.) for the moisture analyzer after start and start mass recorded in the memory is bigger than 4% (turn the instrument on with load on the pan).
"The difference > 1% Max"	**2.9**	Difference between calibration mass currently measured and calibration mass recorded in the memory is bigger than 1%.
"The sample mass < 1g "	**2.10**	Value of sample mass below 1 g.
"The sample mass outsider the range"	**2.11**	Value of the sample mass below value settled in the parameter „Sample– necessarily" in data base of drying programs
"Rev < 1000 Div"	**2.12**	Value of reference mass in the function of deviation under 1000 reading unit
Difference > 20%	**2.13**	Calibration factor of drying chamber id different to factory factor of the chamber in more than 20%
"Outside range"	**3.1**	Value of the parameter apart from admissible range
"Faulty value"	**3.2**	Inadmissible value of the parameter.
"Incorrect password"	**3.4**	
"Record error "	**4.1**	Errors in data transmission to the
"Parity error"	**4.2**	computer or the printer
"Table error"	**4.3**	
"suspended transmissionCTS"	**4.4**	
"suspended transmissionXOFF"	**4.5**	
"Incorrect date"	**5.1**	Wrong date.

"overcrossed time"	**6.1**	Transgressed admissible time to realize one operation (e.g. setting to zero).

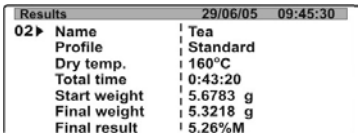
18. MEMORY OF PERFORMED MEASUREMENTS

Moisture analyzer enables memorizing **Max 100** recently performed measurements containing following data such as date, measurement time, name, profile, drying temperature, drying time, start mass, final mass and final result.
Measurements are recorded in pile. After memorizing 100 measurements, next one (101 measurement) will be added in position 99, and whole list will be moved one position upper. This will cause deleting of measurement from position 00. To enter in measurements memory:

From weighing state press **Display** key.
Window containing particular measurements will appear.

Data are arranged according to schedule of their performing, if measurement was performed acc. to Program from Data Base, then next to date and time of measurement, name of program is displayed. To print data place indicator next to required measurement and press **Setup** key.

Measurement data will be displayed (arrangement as on printout).



To print these data, press PRINT key. Data will be sent to RS232 port.

19. PRINCIPLE OF USE OF MOISTURE ANALYZER FOR DRYING TEMPERATURE ABOVE 160°C

For measurement temperatures in range of 161° C – 250° C time of keeping the temperature during the measurement is determined in proportion with range of 1 hour for 161° C – 20 min for 250° C.

During drying in temperature of 250° C, Max temp is kept for 20 min, then program automatically decreases the temperature (without stopping the drying) to 160° C.

Time of decreasing the temperature to 160° C is 20 min.
For rapid profile of Max drying temperature is 30% but no more than Max temperature set in factory menu.

For step profile time of keeping the temperature for particular steps is limited to 20 min.

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